APPENDIX B

AMERICAN BUREAU OF SHIPPING STAMPED DRAWINGS

SAMCO ABS stamped drawings for VOS 6,350 m^3/hr installation aboard a VLCC.

Electronically published by ABS Busan.
Reference 660721. dated 08-DEC-2010.

FOUNDED 1862 ABS

SAMGONG VOS CO.. LTD.
1464-2. SONGJUNG-DONG.
KANGSO-KU. BUSAN.
KOREA

Reference: YHK/ivk/660721
Project Number: 2402444
Class Number: YY208663
Date : 8 December 2010

ATTN: Mr. Y. M. Cho / Director

Shipyard. Hull Numbers: HYUNDAI SAMHO HEAVY INDUSTRIES CO.. LTD.. HULLS S501. S502. S556. S557
"BALLAST WATER TREATMENT SYSTEM–SAMGONG VOS"
Your Ref.: VOS-1007-018

Gentlemen:

We have your above referenced transmittal of 05 July 2010 and with regard thereto have to advise that. insofar as our requirements for the 2010 Rules for classification are concerned. the arrangements and details as indicated appear to be satisfactory in association with the attached comments.

The attached comments. P-086 thru P-100. E-058 thru E-063 are to be replied to this office.

A hard copy of the subject drawings stamped to indicate our review is being returned.

Our invoice to cover the cost of the subject review will be sent separately.

Should you need and clarification. please do not hesitate to contact Mr. Young Ho Kang at 82-51-460-4130 or the undersigned at 82-51-460-4135. In case of inquiry by a phone or reply by a document. please inform or refer to Reference No. and the date of this letter.

Very truly yours.

ABS PACIFIC
Frank Violette.
Director of Engineering

By:
Jeong-Yong Kim.
Principal Engineer - Mach'y
Ship Engineering Systems

Encl: Comment List (5 Sheet)
cc: ABS Pacific. Mokpo/Busan(Operation) – w/p. + c.s.
HYUNDAI SAMHO HEAVY IND. CO.. LTD.: Mr. J. H. Choi / Manager of Hull Design Dep't.
Fax No.: +82-61-460-3744

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Comments List

Thread No	Comment Text	Facilities	Action
E-058	None (Dwg) - Ballast Water Treatment System	S557[Open]. S556[Open]. S502[Open]. S501[Open]	Technical
	Any electrical equipment or components installed in the hazardous area is to be suitable for the service and location in accordance with 5C-1-7/31 & 4-8-4/27 of the Rules. Please confirm/advise.		
E-059	None (Dwg) - Ballast Water Treatment System	S557[Open]. S556[Open]. S502[Open]. S501[Open]	Technical
	Please note that inert gas generators are to be provided a shutdown at the Fire Fighting Station as per 4-9-4/21.3 of the Rules for an automated vessel where the propulsion machinery space is periodically unmanned. Please advise/confirm.		
E-060	None (Dwg) - Ballast Water Treatment System	S557[Open]. S556[Open]. S502[Open]. S501[Open]	Technical
	Electrical system associated with "Inert Gas System" is to be submitted indicating protection against overload and short circuit by automatic protective devices. so that in the event of an overload or a short circuit. the device will operate to isolate it from the systems. as per 4-8-2/9 of the Rules. Please advise/confirm.		
E-061	None (Dwg) - Ballast Water Treatment System	S557[Open]. S556[Open]. S502[Open]. S501[Open]	Technical
	For inert gas systems of the inert gas generator type. audible and visual alarms are to be provided for failure of the power supply to the generator and failure of the power supply to the automatic control system for the generator. as per 5C-1-7/25.37.2 of the Rules. Please advise/confirm.		
E-062	None (Dwg) - Ballast Water Treatment System	S557[Open]. S556[Open]. S502[Open]. S501[Open]	Technical
	Cables associated with the subject system are to be in accordance with IEC Publication 60092-353. IEEE Std-45 or other marine standards acceptable to the Bureau as per 4-8-1/5.1.1 of the Rules. Please advise/confirm.		
E-063	None (Dwg) - Ballast Water Treatment System	S557[Open]. S556[Open]. S502[Open]. S501[Open]	Technical
	Control panels' enclosures and assemblies are to be constructed as per 4-8-3/5.3.1 and 4-8-3/Table 2 of the Steel Vessel Rules. Please note that. the disconnecting devices for motor controllers are to be in accordance with 4-8-3/5.3.5 of the Rules. Please advise/confirm.		
P-086	None (Dwg) - Ballast Water Treatment System	S557[Open]. S556[Open]. S502[Open]. S501[Open]	Technical
	Where the ballast tanks of an oil carrier are intended to be continuously inerted and shut-off valves are to be installed for the isolation of the ballast tank vents. the arrangement would be acceptable provided the following conditions are satisfied. Please confirm/advise. 1. The venting system of the ballast tanks is to comply with SOLAS Reg. II-2/59.1 (SOLAS Reg. II-2/4.5.3. Consolidated Edition. 2004). 2. The inert gas system of the ballast tanks is to comply with SOLAS Reg. II-2/62 (SOLAS Reg. II-2/4.5.5.3. Consolidated Edition. 2004). 3. Connection of the inert gas system of the ballast tanks with the inert gas system of the cargo tanks is permitted only upstream of the gas-regulating valve or valves. 4. The inert gas system of the ballast tanks may be common with the inert gas system of the cargo tanks upstream of the gas regulating valve. In that case. the common inert gas system is to be capable of delivering the inert gas at a rate of at least 125% of the total maximum transfer rate of discharge of the cargo tanks and the ballast tanks. As an alternative. the common inert gas system is to be capable of delivering inert gas at a rate of at least 125% of the maximum rate of discharge of the cargo tanks or the ballast tanks. whichever is greater. under the condition that separate gas regulating valves are provided for the cargo inert gas main and the ballast inert gas main. The gas regulating		

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	valves are to be interlocked so that only one valve is open at a time. 5. The ballast tanks are to be fitted with a remote closed tank level gauging system and a tank overfill protection system in compliance with sections 5C-1-7/21.15.1. 5C-1-7/21.15.2 and 5C-1-7/21.15.4 of the Steel Vessels Rules. 6. The ballast tanks are to be fitted with a permanent hydrocarbon gas detection system capable for operation in a low-oxygen environment. 7. Emergency stop arrangements of the ballast pump prime movers are to be provided at the location(s) where the ballast system is normally controlled. 8. An ABS-approved detailed instruction manual for the inert gas system of the ballast tanks complying with section 11 of IMO MSC/Circ.353 is to be provided.		
P-087	None (Dwg) - Ballast Water Treatment System	S557[Open]. S556[Open]. S502[Open]. S501[Open]	Technical
	With regard to the magnetic spill valves, provided the arrangement complies with the following, it is considered that the use of spill valves would be a suitable alternative to the over fill alarm. Please confirm/advise. 1. The spill valve(s) are properly sized to ensure that the ballast tank will not be subjected to excessive pressure when considering the worst case ballasting scenario during the overflowing of ballast water. 2. The spill valve(s) comply with the requirements of 5C-1-7/21.15.5(a) (i.e. relief setting above P/V valve setting & recognized standard). 3. A closed gauging system complying with 5C-1-7/21.13 is installed for each ballast tank and provides a display where the ballast pumps are controlled. 4. A high level alarm system is installed for each ballast tank and activates an alarm at all locations where the ballast pumps are controlled. The high level alarm may be integral with the closed gauging system.		
P-088	None (Dwg) - Ballast Water Treatment System	S557[Open]. S556[Open]. S502[Open]. S501[Open]	Technical
	With regard to the magnetic spill valves, we would have no objection to accepting the indicated venting arrangement of the ballast tanks together with fitting of the magnetic spill valves on the ballast tanks in association with the following comments. Please confirm/advise. 1. We note that the magnetic spill valves will be fitted on each ballast tank and raised above the open deck by 760mm in compliance with the Load Line requirements. 2. Each ballast tank is to be fitted with sufficient quantity of spill valves to equal or exceed 125% of the cross sectional area of ballast filling line to the tank. 3. Regarding overfill alarm, we understand that there will be one gauging device in each ballast tank that will send an indication of the water level in the tank to the alarm system. The alarm system will then set off one alarm at "High Level" and another at "Overfill" condition. 4. Regarding scantlings of the ballast tank boundaries, we advise that the tank scantlings are to be suitable to withstand the pressure corresponding to the spill valve set-pressure plus the hydrostatic pressure head from the point where the magnetic spill valve is located. 5. The operating manual for ballast/deballast operation is to clearly specify all limitations and prohibitions indicating when a tank may be ballasted or deballasted. 6. The ballast/deballast operation is to be carried out under the supervision of a responsible officer onboard. 7. The installation of the "spectacle flange" on the IGS main venting arrangement of the ballast tank in either position "open" or "close" is to be carried out under the authority of a responsible officer onboard. 8. The indication and/or information relative to the position status of the "spectacle flange" (i.e., whether or not the IGS main venting arrangement is available to a ballast tank) are to be made available to personnel (crew/engineers) responsible for operating the ballast pump(s) at all times. Based on the discussion between the yard and ABS Busan technical office, we note the following: i. Each "spectacle flange" will be of the swing flange type so that the status of the flange (open or closed) will be obvious to anyone looking at that portion of piping. ii. The ABS approved operating manual for the ballast tank IGS system will require that the crew do a visual inspection of the position of each "spectacle flange" on deck before carrying out any ballast		

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	water transfer operations. iii. The operating manual will also call for the ballast valves for any ballast tank that has been isolated from the IGS main to be "tagged" in the closed position. 9. Ballast/deballast operation is PROHIBITED for a ballast tank when the tank is isolated from IGS main venting arrangement. This is to be clearly indicated in the "operating manual". 10. The Ballast Water Treatment System for the subject vessel is of the type that the release of the Ballast water back into the sea would not be harmful to the Environment.			
P-089	None (Dwg) - Ballast Water Treatment System	S557[Open]. S501[Open]	S556[Open].	S502[Open]. Technical
	For BWT sampling units or BWT dosing units located in a "non-hazardous" area such as the engine room, which are connected to a ballast water system in a "hazardous" area such as the cargo area of an Oil Carrier or Chemical Carrier via piping, the interconnections between the "hazardous" (non-safe) area and the "non-hazardous"(safe) area are of particular concern due to the possible migration of hydrocarbon or other flammable liquids or vapors from the "hazardous" area to the "non-hazardous" area and must be adequately addressed. Accordingly, details installation drawings are to be submitted for our review. Please confirm/advise.			
P-090	None (Dwg) - Ballast Water Treatment System	S557[Open]. S501[Open]	S556[Open].	S502[Open]. Technical
	Detailed operating manuals are to be provided onboard, covering the operations, safety and maintenance requirements and occupational health hazards relevant to the inert gas system and its application to the ballast tank system. The manuals are to include guidance on procedures to be followed in the event of a fault or failure of the inert gas system. Also, the manuals are to include detailed requirements for gas freeing operation & indication and/or information relative to the position status of the "spectacle flange" (i.e., whether or not the IGS main venting arrangement is available to a ballast tank). Accordingly, the operation manual is to be submitted to us for our review. Please confirm/advise.			
P-091	None (Dwg) - Ballast Water Treatment System	S557[Open]. S501[Open]	S556[Open].	S502[Open]. Technical
	Inert gas generators are to be certified by the Bureau as per 4-1-1/3.7 and Table 5 of the Rules. Please advise/confirm.			
P-092	None (Dwg) - Ballast Water Treatment System	S557[Open]. S501[Open]	S556[Open].	S502[Open]. Technical
	In accordance with the Guide for Inert Gas System for Ballast Tanks 2/1.9.2 the system is to be capable of delivering inert gas with a SO2 content of not more than 2 ppm in the inert gas supply main to the ballast tanks at any required rate of flow. Please confirm/advise.			
P-093	None (Dwg) - Ballast Water Treatment System	S557[Open]. S501[Open]	S556[Open].	S502[Open]. Technical
	In accordance with the Guide for Inert Gas System for Ballast Tanks 2 / 1.11.3. 1.15.3 the fuel oil pumps serving the inert gas generator and the cooling water pumps serving the flue gas scrubber and the Deck Seal Pumps are to be certified in accordance with the requirements of Appendix 2. Please confirm/advise.			
P-094	None (Dwg) - Ballast Water Treatment System	S557[Open]. S501[Open]	S556[Open].	S502[Open]. Technical
	In accordance with the Guide for Inert Gas System for Ballast Tanks 2/1.41.2. For inert gas systems of the inert gas generator type the relevant requirements for control of fired burners in 4-4-1/11.5 of the Rules for Building and Classing Steel Vessels are applicable. In addition, audible and visual alarms are to be provided in accordance with 2/1.41.1. i) Low water pressure or low water flow rate to the flue gas scrubber as referred to in 2/1.15.1 ii) High water level in the flue gas scrubber, as referred to in 2/1.15.1 iii) High gas temperature, as referred to in 2/1.33 iv) Failure of the inert gas blowers, as referred to in 2/1.17 v) Oxygen content in excess of the limit specified in 2/1.9.1, as referred to in 2/1.35.1ii) vi) Failure of the power supply to the automatic control system for the gas regulating valve and to the			

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	indicating devices. as referred to in 2/1.21 and 2/1.35.1 vii) Low water level in the water seal. as referred to in 2/1.23.1 viii) Gas pressure less than 100 mm water gauge. as referred to in 2/1.35.1i) ix) High gas pressure. as referred to in 2/1.35.1i) x) SO2 content in excess of the limit specified in 2/1.9.2. as referred to in 2/1.35.1iii)			
P-095	None (Dwg) - Ballast Water Treatment System	S557[Open]. S501[Open]	S556[Open].	S502[Open]. Technical
	For inert gas systems of the inert gas generator type the relevant requirements for control of fired burners in 4-4-1/11.5 of the Rules for Building and Classing Steel Vessels are applicable. In addition. audible and visual alarms are to be provided in accordance with 2/1.41.1. and the following: i) Insufficient fuel oil supply ii) Failure of the power supply to the generator (This condition is to also automatically shut down the gas-regulating valve.) iii) Failure of the power supply to the automatic control system for the generator In addition. fuel oil supply to the gas generator is to be automatically shut down in the event of a) low water pressure (or flow) to scrubber and b) high gas temperature. Please confirm/advise.			
P-096	None (Dwg) - Ballast Water Treatment System	S557[Open]. S501[Open]	S556[Open].	S502[Open]. Technical
	In accordance with the Guide for Inert Gas System for Ballast Tanks 2/1.41.3 Automatic shut-down of the inert gas blowers and gas regulating valve is to be arranged on predetermined limits being reached in accordance with 2/1.41.1i). 2/1.41.1ii) and 2/1.41.1iii). Further. 2/1.41.4 specifies - Automatic shut-down of the gas regulating valve is to be arranged in accordance with 2/1.41.1iv). Please confirm/advise.			
P-097	None (Dwg) - Ballast Water Treatment System	S557[Open]. S501[Open]	S556[Open].	S502[Open]. Technical
	The Guide for Inert Gas System for Ballast Tanks 2/1.41.6 specifies the alarms required in 2/1.41.1v). 2/1.41.1vi) and 2/1.41.1viii) are to be fitted in the machinery space and in addition such a locations that they are immediately received by responsible members of the crew. Please confirm/advise.			
P-098	None (Dwg) - Ballast Water Treatment System	S557[Open]. S501[Open]	S556[Open].	S502[Open]. Technical
	Please note as per the intent of 2/1.41.1vii). an adequate reserve of water is to be maintained at all times and the integrity of the arrangements to permit the automatic formation of the water seal when the gas flow ceases is also to be maintained. The audible and visual alarm on the low level of the water in the water seal is to operate when the inert gas is not being supplied. Further. an audible alarm system independent of that required in 2/1.41.1viii) is to be provided to operate on predetermined limits of low pressure in the inert gas mains being reached. Please confirm/advise.			
P-099	None (Dwg) - Ballast Water Treatment System	S557[Open]. S501[Open]	S556[Open].	S502[Open]. Technical
	The Guide for Inert Gas System for Ballast Tanks 2/1.35 specifies the Monitoring of Inert Gas required following. Please confirm/advise. 1. Instrumentation is to be fitted for continuously indicating and permanently recording when the inert gas is being supplied: i) The pressure of the inert gas supply mains forward of the non-return devices required by 2/1.23.1 ii) The oxygen content of the inert gas in the inert gas supply mains on the discharge side of the gas blowers. iii) The SO2 content of the inert gas in the inert gas supply mains on the discharge side of the gas blowers. 2. The devices in 2/1.35.1 are to be placed in the cargo control room. where provided. However. where no cargo control room is provided. they are to be placed in a position easily accessible to the officer in charge of the ballast operations. 3. In addition. displays are to be fitted:			

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	i) In the navigation bridge to indicate at all times the pressure referred to in 2/1.35.1i) ii) In the machinery control room or in the machinery space to indicate the oxygen content referred to in 2/1.35.1ii) iii) In the machinery control room or in the machinery space to indicate the sulfur content referred to in 2/1.35.1iii)			
P-100	None (Dwg) - Ballast Water Treatment System	S557[Open]. S501[Open]	S556[Open].	S502[Open]. Technical
	All valves, piping fittings and flanges are to be constructed and tested in accordance with a recognized standard acceptable to this Bureau. Otherwise drawings showing details of construction, materials and design calculations or burst test results are to be submitted for our review. Please confirm/advise.			

ABS PACIFIC DIVISION
8TH FL., KYOBO BUILDING #88-7, 4-KA, CHUNGANG-DONG, CHUNG-KU, BUSAN 600-737, KOREA
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SEE ABS COMMENT ON THE LETTER

FOR APPROVAL

Tampering or breaking the seal will invalidate review status.

MESSRS. HSHI

SHIP Nos. S501/502, S556/557

CONTROL NO. SH0501V

SAMGONG VOS SYSTEM
BALLAST WATER TREATMENT SYSTEM

REVIEWED
as indicated in
ABS Letter dated:
0 8 DEC 2010
ABS
FOUNDED 1862
BUSAN

ISSUED
2010. 07. 05
SAMGONG
VOS

SAMGONG
VOS

SHIP TYPE	318K DWT CLASS CRUDE OIL CARRIER	CLASS	ABS
MESSRS	HYUNDAI SAMHO HEAVY INDUSTRIES CO., LTD.	SHIP NO.	S501/502, S556/557

PLAN HISTORY

REV. NO.	DESCRIPTION	DATE	PAGE	APPROVED
	RECEIVED ORDER FROM SHIPYARD.	2010.06.22		Yo M. Cho
	SUBMITTED DWG. FOR APPROVAL TO SHIPYARD.	2010.06.28		Yo M. Cho

INDEX

I. TECHNICAL DATA

1. VOS System Performance

1.1 Ballast Water Treatment

The Venturi Oxygen Stripping™ (VOS) ballast water treatment system enables ships' ballast water discharge to be in compliance with the Regulation D-2 ballast water discharge standards of the 2004 International Convention for the Control and Management of Ships' Ballast Water and Sediments. The VOS system is Type Approved in accordance with the requirements of the specifications contained in the Revised G8 Guidelines contained in IMO Resolution MEPC.174 (58).

Venturi Oxygen Stripping™ (VOS) removes up to 95 percent of dissolved oxygen (DO) from seawater in seconds by mixing very-low-oxygen gas into the ballast water as it is being drawn into the vessel. The oxygen stripping gas is generated using a thermal oxidation device similar to the systems currently used on tankers to inert flammable cargo. The gas/water mixing is accomplished by passing the water through venturi injectors installed into the ballast piping.

Ballast water treatment capacity	6,350 m³/hr
Turn down ratio	2:1
Treated water residual dissolved oxygen concentration	0.8 mg/l

1.2 Ballast Tank Inerting

The VOS system equips vessels with a means to maintain an inerted condition in ballast tanks. The VOS ballast tank inerting sub-system is designed to render and maintain the atmosphere of the ballast tanks at or below 4% by volume of oxygen at all times, except when such tanks are required to be gas free. The VOS ballast tank inerting sub-system is designed to comply with the 2004 ABS Guide for Inert Gas Systems for Ballast Tanks. The purpose of the inerting step is to:

- Sustain the de-oxygenation of treated ballast water entering ballast tanks.
- Prevent the risk of explosion in ballast tanks caused by ignition of hydrocarbon gas leaking in from adjacent cargo (tankers only) or fuel tanks.
- Reduce corrosion in ballast tanks.

This step of the VOS treatment is not optional; it is an integral part of the VOS system. If VOS-treated de-oxygenated ballast water is introduced into aerated ballast tanks, treated water rapidly re-aerates, and compliance with the Regulation D-2 (see above) ballast water discharge standards may not be achieved.
The capacity of the VOS ballast tank inerting system is 125% of the combined rate of discharge of the ballast tanks.

Ballast tank inerting capacity	7,938 m³/hr

1.3 Table Listing of the Alarms & Trips in VOS System

#	ALARM/ FAULT	AUDIBLE / VISUAL	TRIP SYSYTEM	TRIP WATER VALVE	TIME DELAY	SENSOR NUMBER
1	Communication Fail of S.G.G Control Panel	O	O	O		INTERNAL
2	Flame Failure of S.G.G	O	O	O		1405
3	Overboard Valve Fault of S.G.G	O	O			Shipyard supply
4	Control Air low Pressure of S.G.G	O	O		O	1806
5	Low Combustion Air of S.G.G	O	O		O	1308
6	Low Water Pressure of S.G.G	O	O		O	1110
7	High Temperature of S.G.G	O	O			1415
8	Low Fuel Pressure of S.G.G	O	O		O	1204
9	Water Level High of S.G.G	O	O	O	O	1607
10	High Back Pressure of S.G.G	O	O		O	1608
11	Blower Fail of S.G.G	O	O		O	INTERNAL
12	Fuel Pump Fail of S.G.G	O	O			INTERNAL
13	Low Deck Main Pressure of Gas Main Line	O			O	3801-1
14	High Deck Main Pressure of Gas Main Line	O			O	3801-1
15	Low-Low Deck Main Pressure of Gas Main Line	O			O	3801-2
16	High-High Oxygen of Stripping Gas	O			O	INTERNAL
17	High Oxygen of Stripping Gas	O			O	INTERNAL
18	High Dissolved O_2 of Ballast Water	O			O	INTERNAL
19	Mast Riser Valve Fault	O				3501
20	A.P.Tank Vent Line Valve Fault	O				3502
21	Deck Seal Low Water Level	O			O	3005
22	Deck Seal High Water Level	O			O	3003
23	Deck Seal Low Water Flow from Deck Seal Pump	O	O		O	3006

2. VOS System Component Specifications

2.1 Stripping Gas Generator

Stripping Gas Specification :

Stripping Gas Capacity	7,938 m³/h
Stripping Gas Specification	0.2% O_2
	14% CO_2 approx.
	<150 ppm NOx
	<5ppm SOx (at <1%S in DO)
	Soot 0 Bacharach scale
	N_2 Balance
Stripping Gas Temperature	Water temp. + 5°C
Stripping Gas Delivery Pressure to Venturi Injectors	0.33 kgf/cm²
Stripping Gas Delivery Pressure to Ballast Tanks	0.09 kgf/cm²
Stripping Gas Humidity	100%

Utilities :

-Electrical		
Power Supply	440V, 3ph, 60Hz	
Control Supply	24V, DC, Internal supply	
Power Failure Supply	24V, DC, 0.05 kW	
Combustion Air Blowers (x2)	90 kW rated	76.4 kW run
Fuel Oil Pump Motor (x2)	2.5 kW rated	1.0 kW run
Control System	1.5 kW rated	
All E-motors IP44 protection		
-Compressed Air		
Supply Pressure	6~9 kgf/cm²	
Consumption	2 m³/hr	
-SGG Dimensions (LxBxH) (mm)	4800 x 2600 x 3700	
Weight	8,200kg	

2.1.1 Water Supply/Effluent (1100)

Quality	filtered seawater (8mm mesh)
Supply Pressure	2 ~ 4 kgf/cm²
Inlet Temp.	Max. 32 deg C
Consumption	665 m³/hr

1106 A manual butterfly valve isolates the water supply at the S.G.G.

1107 An automatic shut off valve closes off water flow to the wash tower in the event of high level or flame failure.

1108 S.G.G Cooling Water Pressure Gauge verifies cooling water delivery to the S.G.G.

1109 Cooling Water Temperautre Gauge monitors the cooling water inlet temperature required for process adjustments.

1110 Cooling Water Pressure Switch ensures S.G.G is not operated without sufficient cooling water.

1111 A control valve in the wash tower effluent line blocks cooling water flow to overboard line in the event of flame failure.

1112 The drain-to-bilge valve opens in the case of flame failure occurring on the S.G.G. This prevents any unburned fuel flowing overboard.

1116 Float valve maintains a water seal at the base of the cooling tower preventing stripping gas from escaping.

2.1.2 Fuel Supply (1200)

Marine Gas Oil (ISO 8217: 2005) DMA(Min.1.5cst at 40°c)
Fuel Consumption 794 liters/hour

1201 Fuel Pump Unit
1201-1 The fuel pump is mounted on a drip tray assembly below the stripping gas
1201-2 generator combustion chamber. The pump is a gear type with a built-in pressure
1202-1 regulator/relief. The unit requires a positive head at the suction filter, 1202, and if
1202-2 necessary the assembly can be relocated next to the fuel source. The unit is
1203-1 designed to be removable and can be remotely located from the S.G.G unit.
1203-2 Manual ball valves 1203 are provided for isolating the pump. Fuel pressure
1204 switch 1204 and gauge 1205 are mounted upstream of the master fuel valve 1207
1205-1 on the S.G.G.
1205-2
1205-3

1206 The fuel pressure regulator is mounted next to the fuel pump assembly.
If the fuel pump is to be relocated, the regulator is configured to remain near the master valve and a fuel return connection provided.

1207 The pilot burner fuel valve is a 1/4 PT direct acting solenoid operated control valve. The unit is certified for fuel service.

1208 All fuel valves are direct acting, solenoid operated control valves. The units
1209 are all certified for fuel service.
1210

2.1.3 Combustion Air (1300)

Temperature	max 50 °c
Pressure at blower inlet	atmospheric
Pressure at blower outlet	0.43 kgf/cm²
Volume	4,260 m³/hr X 2 blowers

1301-1
1301-2 Combustion air blowers (2) are fitted directly onto the Stripping Gas Generator frame. They are cast iron three-lobe "Roots" type, belt driven by TEFC marine motors. A safety relief valve mounted on each blower assembly.

Accessories mounted on or near each blower are:

1302-1
1302-2 Air filters with silencer. Below 100dB.

1303-1
1303-2 Outlet silencers.

1304-1
1304-2 Start-up valve.

1305-1
1305-2 Check (non-return) valve.

1306 The oxygen trim valve is a pneumatically operated control valve.

1307 Pressure Gauge for visual validation of combustion air pressure.

1308 Differential air pressure switch is installed to verify the pressure change through the burner. (correct air flow)

2.1.4 Burner(s) & Combustion Chamber (1400) - 1 / 2

1401 Pilot burner is constructed of steel with a 316 stainless steel flame tube. Designed for easy removal for inspection and cleaning.

1402 Fuel nozzle is standard pressure jet type, easily accessible for change out. Interchangeable with many manufacturers.

1403 Spark igniter is a "14mm spark plug" type.

1404 Ignition transformer is mounted below the main burner in its own enclosure. Output is 7000V 20mA to ensure positive ignition of marine gas oil. One side is grounded.

1405 Flame detector is Honeywell type C7927 "minipeeper" U.V. detector.

1406 Main burner housing is constructed of mild steel. Access to internals is provided by butterfly bolts and a balanced hinged door. Sight glasses are placed at locations to view combustion conditions.

1407
1408 Start Burner/Run burner.Standard fuel nozzle fitted to quick release supply pipes.

1409 Air inlet nozzles are polished stainless steel cones with an outlet designed to pull in hot gas and main fuel which vaporizes before being drawn into the air switches in and out for 50% and 100% gas flow by means of a sliding cover across the air inlet of one of the cones.

1410 The air/fuel mixing section has the shape of an ejector throat and provides suction to pull in hot gas and main fuel which vaporizes before being drawn into the air jet from the inlet nozzle.

1411 The burner support plate is fabricated from 316 stainless steel. The air side holds both items 1410 and 1412.

1412 The flame cone is mounted through the air side (1406) of the burner support plate (1411), and continues the conical shape of air/fuel mixing section (1410) which stabilizes the flame.

1413 The hot gas return pipe draws hot gas from the flame cone and feeds into the main fuel nozzle support on the air/fuel mixing section.

1414 The water jacket/combustion chamber is constructed of 316L stainless steel. Internal baffles to ensure even water distribution are spot welded to the outer jacket only.

2.1.4 Burner(s) & Combustion Chamber (1400) - 2 / 2

1415 Temperature switch set at 70°C is mounted at the water outlet of the combustion chamber.

1416 Small Slider Plate & Pneumatic Cylinder

1417 Large Slider Plate & Pneumatic Cylinder

1418 Solenoid for Pneumatic Cylinder

1419 Igniter Terminal

1420 High Tension Ignition Wire

1421 Orifice Plate (for combustion chamber cooling water)

2.1.5 Cooling / Wash Tower Assembly (1600)

1601 The wash tower body is constructed of 316L stainless steel and access to internal parts is provided by removal of the top section. There is also a access hole at mid-height of the tower. And at the lowest section.

1602
1603 The quench spray nozzle/header assembly provides a 180° curtain of water at the end of the combustion chamber to cool the incoming hot gas.

1604 The tower packing material provides further cooling and removes any traces of sulphur dioxide from the gas moving up through the washtower.

1605 The cooling water header distributes water across the top of the tower packing material through a slotted pipe.

1606 The demister pad captures droplets carried by the gas stream in its knitted stainless steel mesh before the treatment gas travels to the outlet.

1607 High cooling water level sensor provides the systems controls with an alarm that cooling water is rising in the washtower and indicates system shutdown.

1608 High pressure switch initiates system shutdown if the inert gas pressure in the washtower is too high.

1609 Expansion joint for vent to atmosphere connection with JIS flange.
Constructed of stainless steel 316L.

1610 Direct Stream Nozzle

1611 Orifice Plate (for distribution header cooling water)

1612 Orifice Plate (for quench spray cooling water)

2.1.6 S.G.G Instruments & Controls (1800)

1801 The oxygen analyzer is mounted in the S.G.G unit and the measuring cell next to the S.G.G outlet to ensure fast response. The cell has a service life of at least two years.

1802 A carbon monoxide analyzer is mounted next to the oxygen measuring cell and provides feedback for the oxygen control circuit to maintain good combustion.

1803 The back-pressure transmitter provides the output to maintain a constant operational pressure inside the S.G.G of 0.34 kgf/cm^2.

1804 A temperature transmitter is mounted at the S.G.G top and provides a continuous read out of gas temperature. Platinum RTD type in a stainless steel thermal well.

1805 Air filter/regulator

1806 Pressure switch

1807 Water temperature transmitter provides cooling water temperature to control the venturi injector process.(RTD type)

1808 Pressure gauge.

2.1.7 Gas Valves (1900)

1901 Vent-to-Atmosphere/back-pressure control valve is wafer butterfly valve with nitrile liner and stainless steel disc. It is fitted with a double acting pneumatic actuator and electronic positioner. In conjunction with the delivery valve (1902), it maintains constant back-pressure inside the S.G.G. The valve is fitted, wired and tubed up on the SGG gas outlet manifold.

1902 A.P.Tank Delivery control valve similar to 1903 except size.

1903 Delivery/Pressure control valve is butterfly valve similar to 1901 except that the actuator is spring-to-close. In conjunction with the vent valve 1901, it maintains constant back-pressure but also controls tank gas pressure, mounted on the SGG but may be relocated easily if necessary to gas line penetration bulkhead (per class rules).

2.2 Venturi Injectors (2000)

2001-1
2001-2

The Venturi injectors are to be installed near the top of the pumproom. It should be oriented in a vertical position with the water outlet side up. Required performance will be delivered with a water pressure inlet of 1.32 kgf/cm² and gas inlet pressure of 0.3 kgf/cm². Standard material of construction is 316L stainless steel. Block valves (2002), at each venturi gas inlet, close off the gas lines when the unit is not in service. These are standard butterfly valves with double acting pneumatic actuators. Pressure transmitters (2003) constructed of 316 stainless steel, including the wiring connection head, are provided to monitor the venturi performance.

2002-1
2002-2

Venturi gas delivery valve butterfly with nitrile liner & 316 stainless steel disc. fitted with double acting pneumatic actuator.

2003-1~5 Venturi pressure transmitter. (For main ballast)

2004-1
2004-2

Ballast reaeration valves same as above(2002) except size.

2006-1
2006-2

Venturi ballast water regulating valves butterfly type with nitrile liner 316 stainless steel disc size fitted with double acting pneumatic actuator and intrirically safe electronic positioner.

2007-1~2 Air intake filter 5 mesh. (For Main ballast)

2012
2013

Test port valve. (For Main ballast)

2014 Deck main O_2 sampling valve.

2101 The A.P.Tank Venturi injector is to be installed vertically in the machinery space near the top of the A.P.Tank with water inlet at the bottom.

2102 A.P.Venturi gas delivery valve same as above(2002) except size.

2103-1~3 Venturi pressure transmitter. (For A.P.tank)

2104 A.P.Venturi reaeration valves same as above(2004) except size.

2105 A.P.Venturi delivery water pressure control valve.

2106 Test port valve. (For A.P.tank)

2107-1~2 Air intake filter 5 mesh. (For A.P.tank)

2.3 Deck and Tank Pressure Control (3000)

2.3.1 Deck Water Seal Unit (3001)

3001
3002
3003
3004
3005

Deck Water Seal to prevent back flow of gas into machinery space. Constructed of 6mm thick mild steel plate and pipe lined internally with 3mm thick rubber. External coating to ship-yard standard. Intrinsically safe high and low level sensors are fitted to the main body of the seal. An alloy heating coil is mounted in the water transfer pipe. A 150mm thick polypropylene demister pad is mounted at the top of the seal below the gas outlet. A manhole cover is provided for demister maintenance and inspection.

3006 Cooling water pressure switch for deck water seal.

3007 Relief valve.

3008 Orifice plate to fit flange

3009 Flame screen.

3101 Deck Water seal vent valve. (spring open actuator)

3102 Ballast tank gas delivery valve.

3104 Ballast tank gas non-return valve.

3105 A.P.Tank gas delivery valve.

3107 A.P.Tank water fill valve.

3108 A.P.Tank water discharge valve.

3109-1
3109-2

A.P.Tank gas delivery non-return valve.

2.3.2 P-V Breaker

3201 The P-V breaker is fitted between mid-ship and the forward end of the stripping gas main. Materials of construction are mild steel and rubber internal lining with inorganic zinc external coating. A sight glass and fill neck are fitted on the side. Fill liquid is 25/75 ethylene glycol/water mixture (automotive antifreeze) and settings are 0.21kgf/cm² pressure and -0.07kgf/cm² vacuum.

3202 Same as above (3201) except size. (for A.P.Tank)

2.3.3 Spectacle Flange

3301 Spectacle flanges are provided for each inert gas branch line to enable isolation of a tank from the gas distribution network.

3302 Same as above (3301) except size. (for A.P.Tank)

2.3.4 Magnet Vent Check Valve (Magnetic Relief Valve)

3401 Magnet vent check valves are provided for each ballast tank in sufficient quantity to equal or exceed 125% of the cross sectional area of the ballast filling line. These valves, constructed of 316 stainless steel are designed to keep the tanks gas tight but will open at a set relief pressure 0.17 kgf/cm², and allow water overflow if ballast tank overfilling occurs.

2.3.5 Mast Riser Valve & Vent Check Valve

3501 The mast riser valve is a standard butterfly valve fitted with a corrosion resistant double acting actuator. A limit switch is integrated to verify the valve position.

3502 A.P.Tank Vent line valve is a standard butterfly valve fitted with a corrosion resistant double acting actuator.

2.3.6 Deck Instrumentation & Control

3801-1 Deck main pressure transmitter monitors the stripping gas pressure in the ballast tanks. 316 stainless steel construction, intrinsically safe.

3801-2 Additional pressure transmitter to provide independent alarm.

3802 Pressure transmitter monitors the stripping gas pressure in the A.P.Tank.

3803-1
3803-1 Solenoid operated pneumatic control valves provide the air to open or close the various deck butterfly valves.

2.4 Control Panels and Starters

4001 The main control panel is mounted directly on the stripping gas generator and is divided into two sections . Power and Control. The power section contains the main circuit breaker for shipyard connection, 2 blower starter circuits, fuel pump starter and 440/220 transformer. The control section contains the flame safe guard circuits for the S.G.G burner, relays for S.G.G valve operation, 220/24 volt power supply and the main control PLC. Terminal strips in the base are numbered for easy connection by shipyard. Outside door has an alarm horn and start/stop buttons for local operation of S.G.G.

Stripping Gas Generator Power and Control Panel (IP44 protection)

4002 The Local Alarm Panel displays alarms and operational condition of the stripping gas generator. Tuning of the PID control circuits may be carried out from the touch screen. The panel may be mounted at any convenient location within sight of the S.G.G.

4003 The Ballast Water Treatment Control Panel comprises a Color Touch Screen panel, emergency stop, beeper and silence buttons mounted on an engraved plate and a control insert mounted in a desktop enclosure with pedestal for mounting at a convenient location in the ballast control room. All operations, alarm checking, testing etc. are carried out from the touch screen panel.

This panel can be mounted separately or integrated into the main Ballast Control Panel and monitors treatment operations

4004 The Data Recorder Panel is a paperless 3 way video graphic data recorder with ethernet cable programmed for ballast tank pressure, S.G.oxygen content and ballast water dissolved oxygen content. It can be mounted in a variety of ways at any desired location.(usually in wheel-house)

4005 Gas Analyzer Panel

4006 Zener Barrier

4007 Junction Box

2.5 Miscellaneous

5001 Portable Oxygen Analyer
Intrinsically safe for use on oil tanker deck.

5002 Portable Dissolved Oxygen Meter. Equipped with a sensing probe.
Suitable for insertion into 40A or larger sounding pipe.

5003 Magnet Vent Check Calibrator Kit
Torque wrench and adapter.

Note: Items marked (*) are assembled on S.G.G(1000) unit.

II. PARTS LIST (SUPPLY LIST)

		Q'TY:	SPEC. (SUPPLY):		CON. NO.:
1000	**Stripping Gas Generator**	**1set**	**S.G.G UNIT**		**29 / 119**
	1100 Water Supply/Effluent				
1106	Water Shut Off to S.G.G Valve	1 ea	5K-300A	(Loose)	68 / 119
*1107	Automatic Water Shut Off to Cooling Tower Valve	1 ea	5K-300A	on SGG	69 / 119
*1108	Water Pressure Gauge	1 ea	PF 3/8"	on SGG	70 / 119
*1109	Temperature Gauge	1 ea	PF 3/8"	on SGG	71 / 119
*1110	Pressure Switch	1 ea	PF 3/8"	on SGG	72 / 119
1111	Diverter-to-overboard Valve	1 ea	5K-350A	(Loose)	73 / 119
1112	Drain-to-Bilge Valve	1 ea	5K-80A	(Loose)	74 / 119
1116	Float Valve	1 ea	5K-350A	(Loose)	75 / 119
	1200 Fuel Supply				
1201	Fuel Pump Unit	1 set		(Loose)	76 / 119
1201-1	Fuel Pump	1 ea	Part of Fuel Pump		76 / 119
1201-1	Fuel Pump	1 ea	Part of Fuel Pump		76 / 119
1201-2	Fuel Filter	1 ea	Part of Fuel Pump		76 / 119
1201-2	Fuel Filter	1 ea	Part of Fuel Pump		76 / 119
1201-3	Pump Valve (manual)	1 ea	Part of Fuel Pump		76 / 119
1201-3	Pump Valve (manual)	1 ea	Part of Fuel Pump		76 / 119
*1204	Fuel Pressure Switch	1 ea	PF 3/8"	on SGG	77 / 119
*1205-1	Fuel Pressure Gauge	1 ea	PF 3/8"	on SGG	78 / 119
*1205-2	Fuel Pressure Gauge	1 ea	PF 3/8"	on SGG	78 / 119
*1205-3	Fuel Pressure Gauge	1 ea	PF 3/8"	on SGG	78 / 119
*1206	Fuel Pressure Regulator	1 ea	16K-20A	on SGG	79 / 119
*1207	Pilot Burner Valve	1 ea	PF 3/8"	on SGG	80 / 119
*1208	Master Fuel Valve	1 ea	PF 1/8"	on SGG	81 / 119
*1209	Start Burner Valve	1 ea	PF 1/8"	on SGG	81 / 119
*1210	Main Burner Valve	1 ea	PF 1/8"	on SGG	81 / 119
	1300 Combustion Air				
*1301-1	Roots Blower/Relief Valve/Motor assembly	1 set	10K-200A	on SGG	82 / 119
*1301-2	Roots Blower/Relief Valve/Motor assembly	1 set	10K-200A	on SGG	82 / 119
*1302-1	Air Filter with Silencer	1 ea	Part of Blower		82 / 119
*1302-2	Air Filter with Silencer	1 ea	Part of Blower		82 / 119
*1303-1	Outlet Silencer	1 ea	Part of Blower		82 / 119
*1303-2	Outlet Silencer	1 ea	Part of Blower		82 / 119
*1305-1	Check (non-return) Valve	1 ea	Part of Blower		82 / 119
*1305-2	Check (non-return) Valve	1 ea	Part of Blower		82 / 119
*1304-1	Start-up Valve	1 ea	5K-200A	on SGG	83 / 119
*1304-2	Start-up Valve	1 ea	5K-200A	on SGG	83 / 119
*1306	Oxygen Trim Valve	1 ea	10K-50A	on SGG	84 / 119
*1307	Pressure Gauge	1 ea	PF 3/8"	on SGG	85 / 119
*1308	Differential Air Pressure Switch	1 ea	PF 3/8"	on SGG	86 / 119

1400 Burner(s) & Combustion Chamber		Q'TY:	SPEC. (SUPPLY):	CON. NO.:
*1401	Pilot Burner Housing	1	Part of S.G.G	
*1402	Fuel Nozzle	1	Part of S.G.G	
*1403	Spark Igniter	1	Part of S.G.G	
*1404	Ignition Transformer	1	Part of S.G.G	
*1405	Flame Detector (U.V.)	1	PT 1/4" on SGG	87 / 119
*1406	Main Housing	1	Part of S.G.G	
*1407	Start Burner Nozzle & Holder	1	Part of S.G.G	
*1408	Run Burner Nozzle & Holder	1	Part of S.G.G	
*1409	Air Inlet Nozzle	1	Part of S.G.G	
*1410	Air/Fuel Mixing Section	1	Part of S.G.G	
*1411	Burner Support Plate	1	Part of S.G.G	
*1412	Flame Cone	1	Part of S.G.G	
*1413	Hot Gas Return Pipe	1	Part of S.G.G	
*1414	Water Jacketed Combustion Chamber	1	Part of S.G.G	
*1415	Temperature Switch	1	PF 1/2" on SGG	88 / 119
*1416	Small Slider Plate & Pneumatic Cylinder	1	Part of S.G.G	
*1417	Large Slider Plate & Pneumatic Cylinder	1	Part of S.G.G	
*1418	Solenoid for Pneumatic Cylinder	1	Part of S.G.G	
*1419	Igniter Terminal	1	Part of S.G.G	
*1420	High Tension Ignition Wire	1	Part of S.G.G	
*1421	Orifice Plate	1	Part of S.G.G	

1600 Cooling / Wash Tower Assembly				
*1601	Cooling/Wash Tower Body	1	Part of S.G.G	
*1602	Quench Spray Header Pipe	1	Part of S.G.G	
*1603	Quench Nozzle	1	Part of S.G.G	
*1604	Tower Packing	1	Part of S.G.G	
*1605	Upper Distribution Header	1	Part of S.G.G	
*1606	Demister pad	1	Part of S.G.G	
*1607	Level Sensor	1	5K-50A on SGG	89 / 119
*1608	High Pressure Switch	1	PF 3/8" on SGG	90 / 119
1609	Vent Line Expansion Joint	1	5K-300A on SGG	91 / 119
*1610	Direct Stream Nozzle	1	Part of S.G.G	
*1611	Orifice Plate (for distribution header)	1	Part of S.G.G	
*1612	Orifice Plate (for quench spyer)	1	Part of S.G.G	

1800 S.G.G. Instruments & Controls		Q'TY:	SPEC. (SUPPLY):		CON. NO.:
*1801	Oxygen Analyzer	1		on SGG	45 / 119
*1802	CO Analyzer	1		on SGG	
*1803	Back Pressure Transmitter	1	PT 1/2"	on SGG	92 / 119
*1804	Temperature Transmitter (RTD)	1	PF 1/2"	on SGG	93 / 119
*1805	Air Filter/Regulator	1		on SGG	
*1806	Pressure Switch	1		on SGG	
*1807	Water Temperature Transmitter (RTD)	1	PF 1/2"	on SGG	94 / 119
*1808	Pressure Gauge	1		on SGG	

1900 Gas Valves					
*1901	Back Pressure Control/Vent-to-atmosphere Valve	1	5K-300A	on SGG	95 / 119
*1902	A.P.Tank Delivery Control Valve	1	5K-80A	on SGG	96 / 119
*1903	Delivery/Pressure Control Valve	1	5K-350A	on SGG	97 / 119

2,000 Venturi Injectors

		Q'TY:	SPEC. (SUPPLY):		CON. NO.:
2001-1	Venturi Injector (For main ballast)	1 ea	5K-600A	(Loose)	31 / 119
2001-2	Venturi Injector (For main ballast)	1 ea	5K-600A	(Loose)	31 / 119
2002-1	Venturi Gas Delivery Valve (For main ballast)	1 ea	5K-200A	(Loose)	98 / 119
2002-2	Venturi Gas Delivery Valve (For main ballast)	1 ea	5K-200A	(Loose)	98 / 119
2003-1	Venturi Pressure Transmitter (For main ballast)	1 ea	PT 1/2"	(Loose)	99 / 119
2003-2	Venturi Pressure Transmitter (For main ballast)	1 ea	PT 1/2"	(Loose)	99 / 119
2003-3	Venturi Pressure Transmitter (For main ballast)	1 ea	PT 1/2"	(Loose)	99 / 119
2003-4	Venturi Pressure Transmitter (For main ballast)	1 ea	PT 1/2"	(Loose)	99 / 119
2003-5	Venturi Pressure Transmitter (For main ballast)	1 ea	PT 1/2"	(Loose)	99 / 119
2004-1	Ballast Reaeration Valve	1 ea	5K-100A	(Loose)	100/ 119
2004-2	Ballast Reaeration Valve	1 ea	5K-100A	(Loose)	100/ 119
2006-1	Venturi Ballast Water Regulating Valve	1 ea	5K-600A	(Loose)	101/ 119
2006-2	Venturi Ballast Water Regulating Valve	1 ea	5K-600A	(Loose)	101/ 119
2007-1	Air Intake Filter (For main ballast)	1 ea	5K-200A	(Loose)	101/ 119
2007-2	Air Intake Filter (For main ballast)	1 ea	5K-200A	(Loose)	101/ 119
2012	Test Port Valve (For main ballast)	1 ea	5K-25A	(Loose)	102/ 119
2013	Test Port Valve (For main ballast)	1 ea	5K-25A	(Loose)	102/ 119
2014	Deck Main O_2 Sampling Valve	1 ea	5K-25A	(Loose)	102/ 119
2101	Venturi Injector (For A.P.Tank)	1 ea	5K-200A	(Loose)	32 / 119
2102	A.P.Venturi Gas Delivery Valve	1 ea	5K-80A	(Loose)	103/ 119
2103-1	Venturi Pressure Transmitter (For A.P.Tank)	1 ea	PT 1/2"	(Loose)	104/ 119
2103-2	Venturi Pressure Transmitter (For A.P.Tank)	1 ea	PT 1/2"	(Loose)	104/ 119
2103-3	Venturi Pressure Transmitter (For A.P.Tank)	1 ea	PT 1/2"	(Loose)	104/ 119
2104	A.P.Venturi Reaeration Valve	1 ea	5K-50A	(Loose)	105/ 119
2105	A.P.Venturi Delivery Water Pressure Cont'l Valve	1 ea	5K-200A	(Loose)	106/ 119
2106	General Purpose Testing Port Valve	1 ea	5K-25A	(Loose)	102/ 119
2107	Air Intake Filter (For A.P. tank)	1 ea	5K-100A	(Loose)	102/ 119

3,000 Deck and Tank Pressure Control

		Q'TY:	SPEC. (SUPPLY):	CON. NO.:
3001	Deck Water Seal	1 set	5K-600A (Loose)	31 / 119
3002	Demister Pad	1 ea	Part of D.W.S	
3003	High Level Switch	1 ea	5K-65A on DWS	107/ 119
3004	Heating Coil	1 ea	Part of D.W.S	
3005	Low Level Switch	1 ea	5K-65A on DWS	107/ 119
3006	Pressure Switch	1 ea	PF 3/8" (Loose)	108/ 119
3007	Relief Valve	1 ea	5K-25A (Loose)	
3008	Orifice Plate	1 ea	5K-50A (Loose)	
3009	Flame Screen	1 ea	5K-150A (Loose)	
3101	Deck Water Seal Vent Valve	1 ea	5K-80A (Loose)	109/ 119
3102	Ballast Tank Gas Delivery Valve	1 ea	5K-400A (Loose)	110/ 119
3104	Ballast Tank Gas Non-Return Valve	1 ea	5K-100A (Loose)	111/ 119
3105	A.P.Tank Gas Delivery Valve	1 ea	5K-100A (Loose)	111A / 119
3107	Venturi to A.P.Tank Valve	1 ea	5K-200A (Loose)	112/ 119
3108	Venturi to Overboard Valve	1 ea	5K-200A (Loose)	113/ 119
3109-1	A.P.Tank Gas Delivery Non-Return Valve	1 ea	5K-400A (Loose)	113A / 119
3109-2	A.P.Tank Gas Delivery Non-Return Valve	1 ea	5K-400A (Loose)	113A / 119
3201	P-V Breaker Assembly (For Main ballast)	1 set	5K-400A (Loose)	36 / 119
3202	P-V Breaker Assembly (For A.P.Tank)	1 set	5K-150A (Loose)	37 / 119
3301	Spectacle Flange (For main ballast)	11 ea	5K-250A (Loose)	114/ 119
3302	Spectacle Flange (For A.P.Tank)	1 set	5K-100A (Loose)	114/ 119
3401	Magnet Vent Check Valve(Magnetic Relief Valve)	35 ea	10K-300A (Loose)	38 / 119
3501	Mast Riser Valve	1 ea	5K-400A (Loose)	115/ 119
3502	Vent Line Valve	1 ea	5K-100A (Loose)	116/ 119
3801-1	Deck Main Pressure Transmitter	1 ea	PT 1/2" (Loose)	117/ 119
3801-2	Deck Main Pressure Transmitter	1 ea	PT 1/2" (Loose)	117/ 119
3802	Deck Main Pressure Transmitter (A.P.Tank line)	1 ea	PT 1/2" (Loose)	118/ 119
3803-1	Solenoid Valve Block For Pneumatic Control Valve	1 set	(Loose)	119/ 119
3803-2	Solenoid Valve Block For Pneumatic Control Valve	1 set	(Loose)	119A/ 119

4,000 Control Panels and Starters

*4001	MainControl with Motor Starter Panel	1 set	on SGG	41 / 119
4002	Local Alarm Panel	1 ea	L380xH380 (Loose)	44 / 119
4003	Ballast Water Treatment Control Panel	1 ea	L520xH350 (Loose)	43 / 119
4004	Data Recorder Panel	1 ea	L144xH144 (Loose)	46 / 119
4005	Gas Analyzer Panel	1 ea	L200xH150 (Loose)	45 / 119
4006	Zener Barrier	1 set	(Loose)	
4007	Junction Box	1 ea	(Loose)	

5,000 Miscellaneous

5001	Portable Oxygen Analyzer	1 ea	(Loose)
5002	Portable Dissolved Oxygen Analyzer	1 ea	(Loose)
5003	Magnet Vent Check Valve Calibrator Kit	2 set	(Loose)

6,000 Spare Parts		Q'TY:	SPEC. (SUPPLY):	CON. NO.:
6001	Honeywell Flame Detector	2 ea	(Loose)	
6002	Fuel Nozzles	8 ea	(Loose)	
6003	Pilot Nozzles	12 ea	(Loose)	
6004	Spark Igniter	1 ea	(Loose)	
6005	Oxygen Cell	1 ea	(Loose)	
6006	CO Analyzer	1 set	(Loose)	
6007	Blower Motor contactor	1 ea	(Loose)	
6008	Blower V Belts	5 ea	(Loose)	
6009	Fuel Pump contactor	1 ea	(Loose)	
6010	PLC Power Supply	2 ea	(Loose)	
6011	220V plug-in relay	4 ea	(Loose)	
6012	24V plug-in relay	4 ea	(Loose)	
6013	Circuit Breaker	2 ea	(Loose)	
6014	Fuses	6 of each type	(Loose)	
6015	Honeywell Flame Controller 7830	1 ea	(Loose)	
6016	Deck Main Pressure Transmitter	1 ea	(Loose)	
6017	Solenoid valves	1 ea	(Loose)	
6018	Water Pressure Transmitter	1 ea	(Loose)	
6019	RTD Sensor	1 ea	(Loose)	
6020	Level Sensor for Deck Seal	1 ea	(Loose)	
6021	O-ring for Magnet Vent Check Valve	35 ea	(Loose)	
6022	Spare Parts Kit for Fuel Pump	1 set	(Loose)	

INSTALLATION ACCESSORIES

The following additional items are supplied:

Pneumatic: Compression connectors for Ø8, Ø10, Ø15. tubing are provided for all pneumatically operated equipment requiring connection by shipyard. Materials are copper for internally mounted and 316 stainless steel for deck mounted items. Any items that require an air supply less than 7 kgf/cm^2 will be fitted with an independent air regulator.

Piping: Half-couplings in 316L stainless steel are supplied for all threaded transmitters and temperature sensors that are to be direct mounted to piping.

III. APPENDIX DRAWINGS

1. Main Drawings

CONTROL NO. :

1-1. SYMBOL LIST

INDICATING INSTRUMENTS

- PI — PRESSURE INDICATOR
- TI — TEMPERATURE INDICATOR
- FS — FRAME SCANNER

SWITCH RELAYS

- PS — PRESSURE SWITCH
- TS — TEMPERATURE SWITCH
- LS — LEVEL SWITCH
- GS — LIMIT SWITCH

TRANSMITTER

- DPS — DIFFERENTIAL PRESSURE SENSOR
- PT — PRESSURE TRANSMITTER
- RTD — TEMPERATURE TRANSMITTER

VENTS

- FLAME SCREEN
- MAGNET VENT CHECK VALVE

PUMPS

- FUEL PUMP
- COOLING WATER PUMP

ELECTRICAL CONNECTIONS

- 2-TERMINAL LIMIT SWITCH
- 3-TERMINAL TEMP. TRANSMITTER
- 2-TERMINAL PRESSURE TRANSMITTER
- 2-TERMINAL PRESSURE SWITCH
- 2-TERMINAL HIGH LEVEL SWITCH
- 2-TERMINAL LOW LEVEL SWITCH

CONNECTION TERMINALS

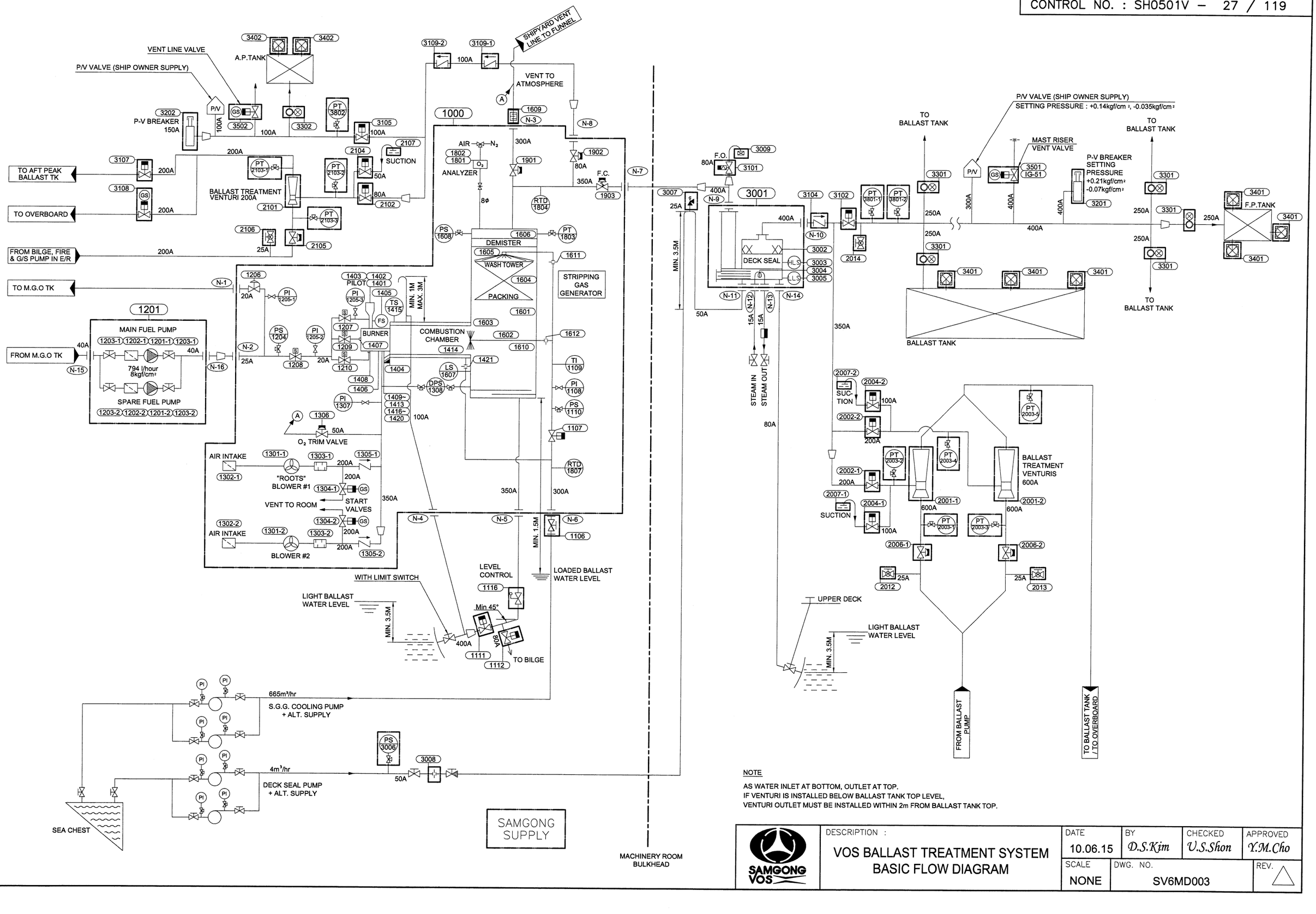
VALVE TYPE

- NEEDLE VALVE
- PRESSURE REGULATOR VALVE
- 3-WAY TEST VALVE FOR PRESSURE SENSOR
- ROOT VALVE FOR GAUGE
- BALL VALVE
- MANUAL SHUT-OFF BUTTERFLY VALVE
- SPECTACLE FLANGE
- PRESSURE / VACCUM VALVE
- NON-RETURN CHECK VALVE
- SOLENOID VALVE
- PRESSURE / VACCUM BREAKER
- SINGLE ACTING PNEUMATIC BUTTERFLY VALVE
- DOUBLE ACTING PNEUMATIC BUTTERFLY VALVE
- FLOAT LEVEL CONTROL VALVE
- SINGLE ACTING PNEUMATIC CONTROL VALVE WITH POSITIONER
- DOUBLE ACTING PNEUMATIC CONTROL VALVE WITH POSITIONER
- F.C. — SPRING TO CLOSE FAIL POSITION
- F.O. — SPRING TO OPEN FAIL POSITION
- RELIEF VALVE(ANGLE)

MISCELLANEOUS

- EXPANSION JOINT
- ORIFICE PLATE
- BLOWER
- SILENCER
- FILTER / STRAINER
- REDUCER
- STEAM TRAP
- AIR INTAKE FILTER

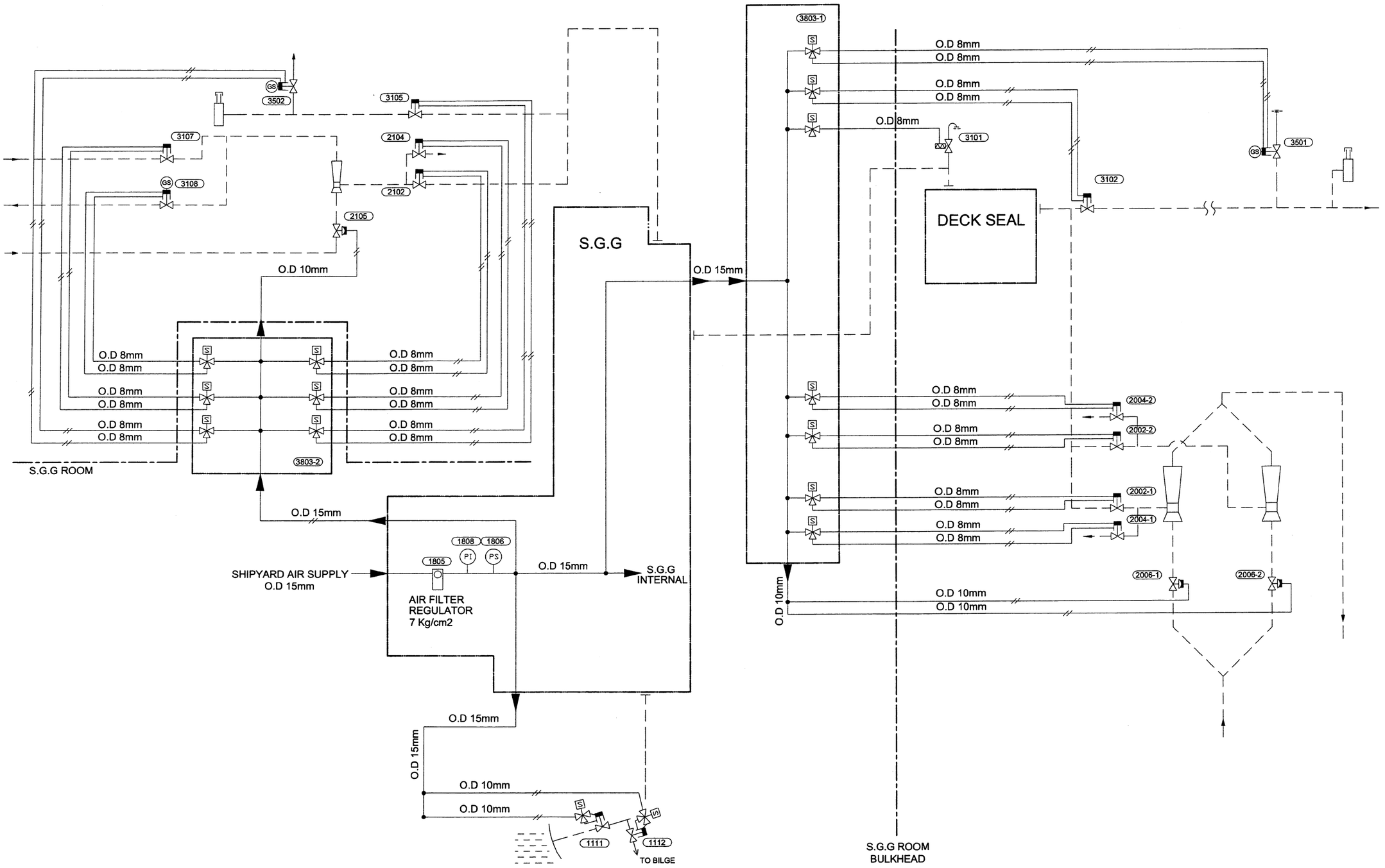
SAMGONG VOS	DESCRIPTION : PROCESS, ELECTRICAL & PNEUMATIC SYMBOLS	DATE 10.06.15	BY D.S.Kim	CHECKED U.S.Shon	APPROVED Y.M.Cho
		SCALE NONE	DWG. NO. SV6MD002		REV.



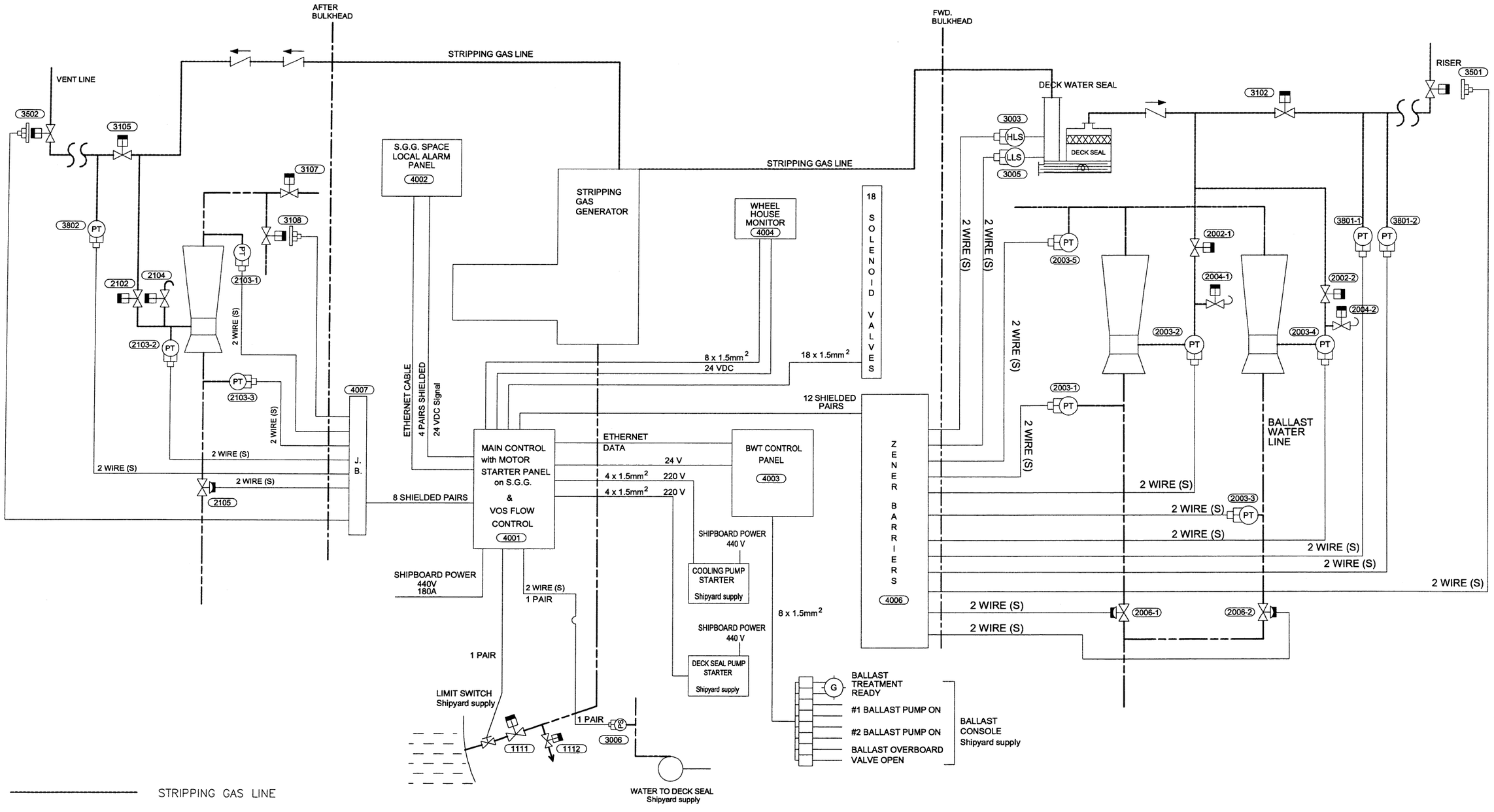
NOTE

AS WATER INLET AT BOTTOM, OUTLET AT TOP.
IF VENTURI IS INSTALLED BELOW BALLAST TANK TOP LEVEL,
VENTURI OUTLET MUST BE INSTALLED WITHIN 2m FROM BALLAST TANK TOP.

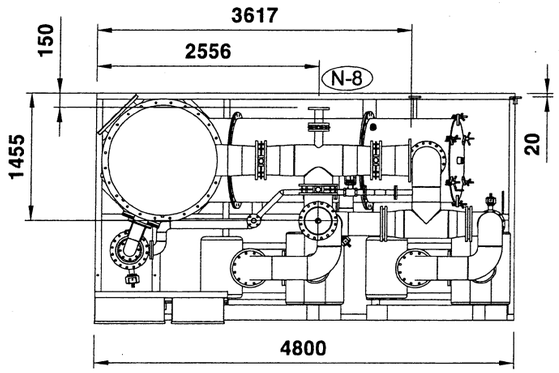
SAMGONG VOS	DESCRIPTION : VOS BALLAST TREATMENT SYSTEM BASIC FLOW DIAGRAM	DATE 10.06.15	BY D.S.Kim	CHECKED U.S.Shon	APPROVED Y.M.Cho
		SCALE NONE	DWG. NO. SV6MD003		REV. △

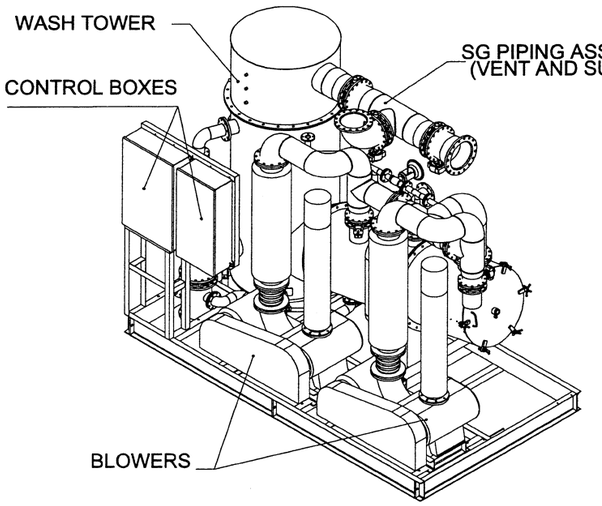


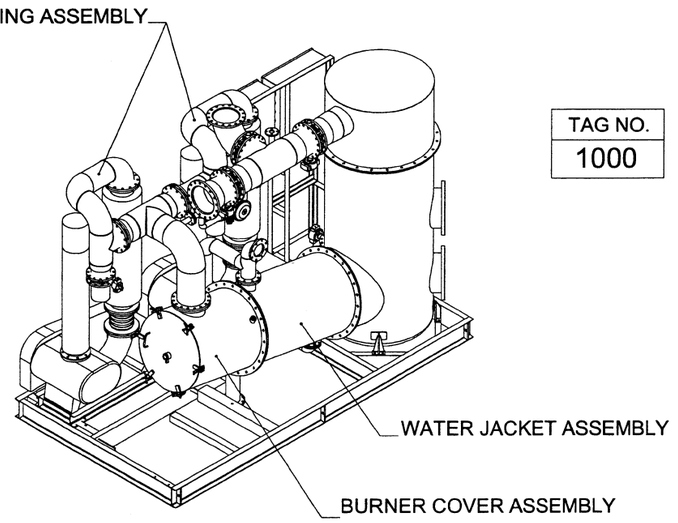
SAMGONG VOS	DESCRIPTION : SHIPYARD PNEUMATIC TUBING CONNECTION	DATE 10.06.15	BY D.S.Kim	CHECKED U.S.Shon	APPROVED Y.M.Cho
		SCALE NONE	DWG. NO. SV6MD004		REV. △



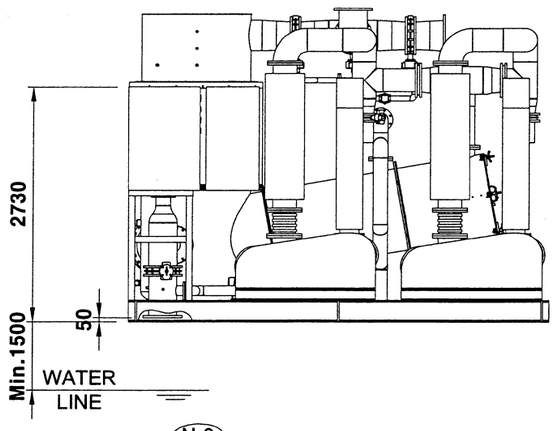
SAMGONG VOS	DESCRIPTION : ELECTRICAL ONE-LINE DIAGRAM (ELECTRICAL SHIPYARD CONNECTIONS)	DATE 10.06.15	BY D.S.Kim	CHECKED V.S.Shon	APPROVED Y.M.Cho
		SCALE NONE	DWG. NO. SV6MD004A	REV. △	

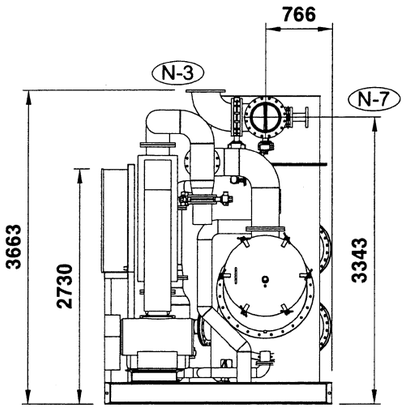


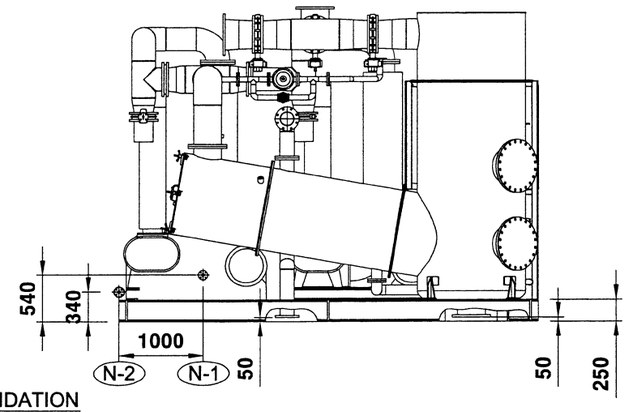


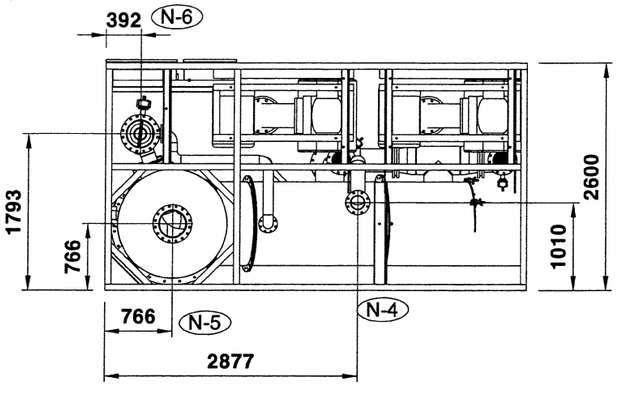


TAG NO.
1000

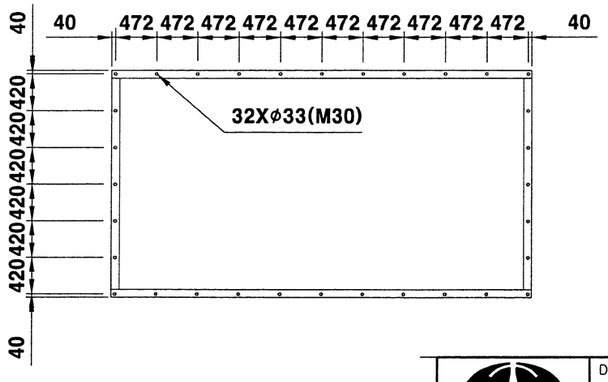








FOUNDATION
CHANNEL 250X90X9t



CONNECTIONS *WEIGHT : Abt. 8200kg

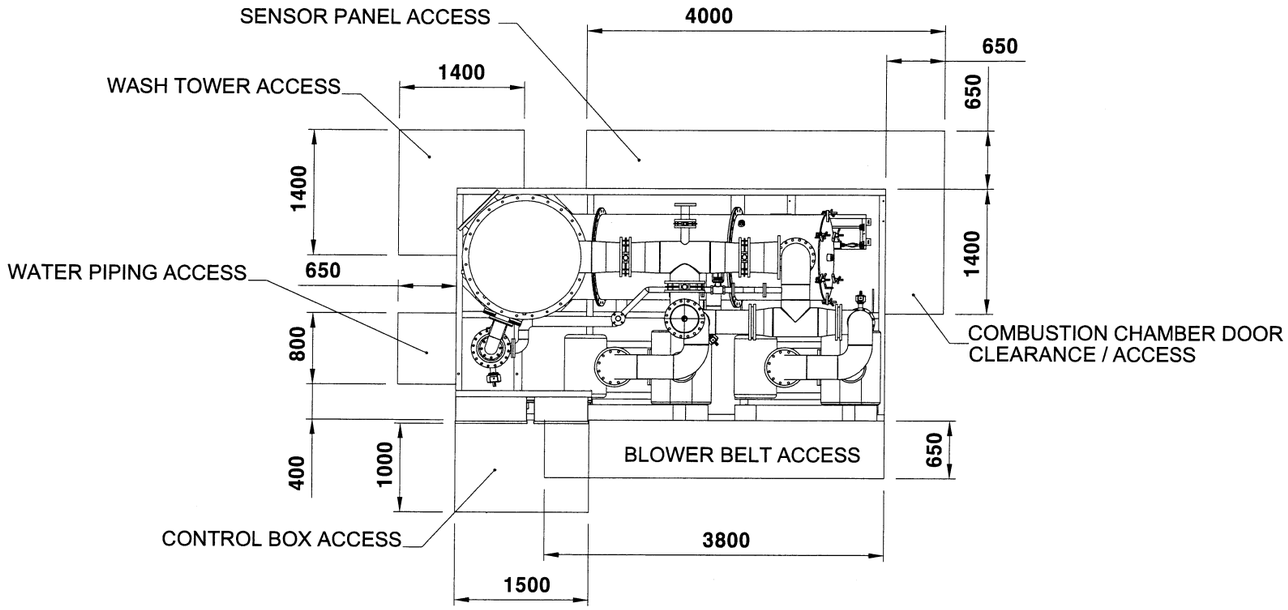
No.	DESCRIPTION	CONNECTION FLANGE
N-1	FUEL OIL INLET	JIS 16K-25A
N-2	FUEL OIL RETURN (TO M.G.O TANK)	JIS 16K-20A
N-3	VENT TO ATMOSPHERE	JIS 5K-300A
N-4	COMBUSTION CHAMBER DRAIN	JIS 5K-100A
N-5	COOLING TOWER DRAIN	JIS 5K-350A
N-6	COOLING WATER INLET	JIS 5K-300A
N-7	GAS DELIVERY FOR MAIN BALLAST TANK	JIS 5K-350A
N-8	GAS DELIVERY FOR A.P.TANK	JIS 5K-80A

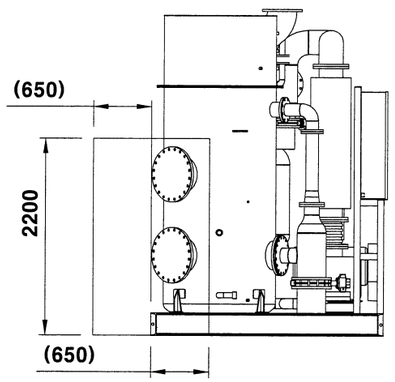
SAMGONG VOS

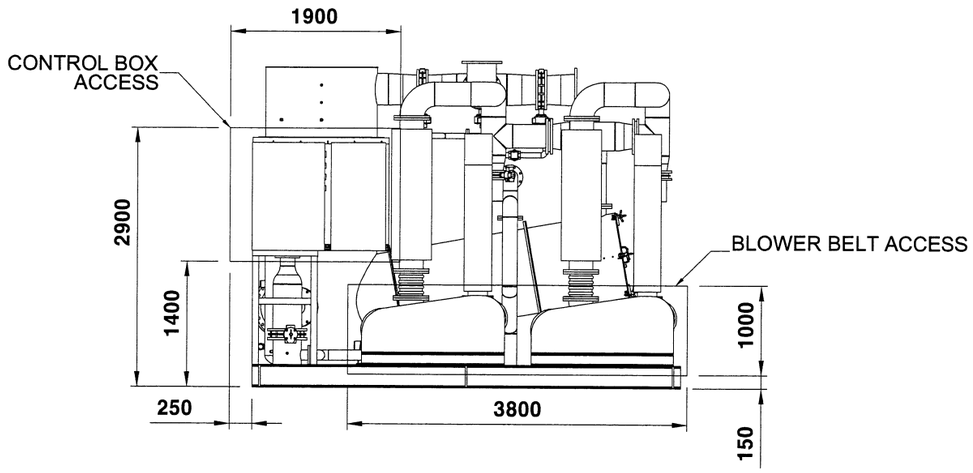
DESCRIPTION :
STRIPPING GAS GENERATOR
PIPING CONNECTIONS

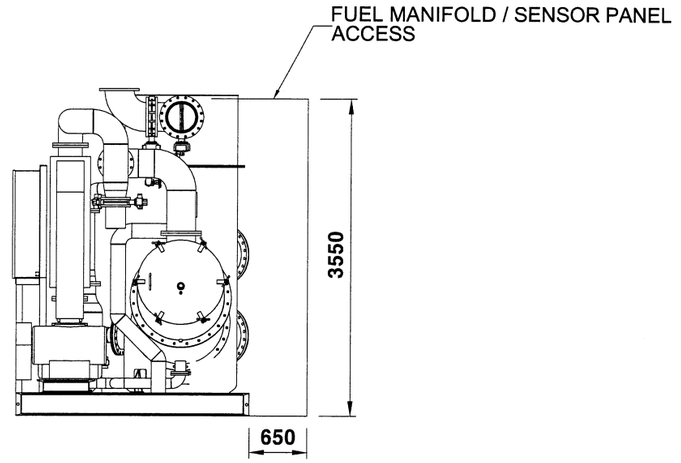
DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho

SCALE	DWG. NO.	REV.
NONE	SV6MD005	△



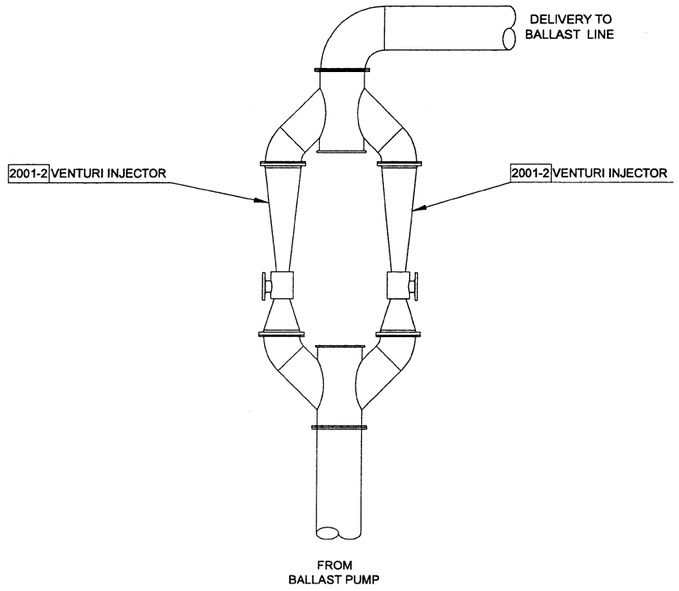




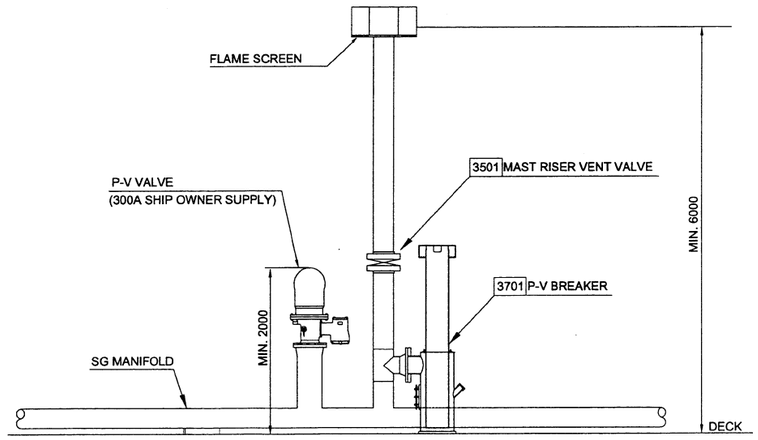


SAMGONG VOS	DESCRIPTION : STRIPPING GAS GENERATOR MAINTENANCE CLEARANCE AND MAJOR SUBASSEMBLY IDENTIFICATION	DATE 10.06.15	BY D.S.Kim	CHECKED V.S.Shon	APPROVED Y.M.Cho
		SCALE NONE	DWG. NO. SV6MD005A		REV. △

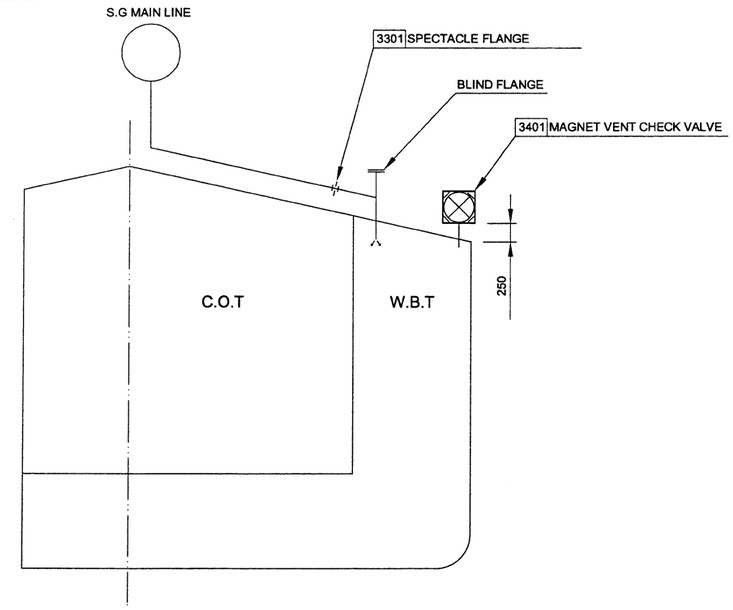
VENTURI SUB-ASSEMBLY



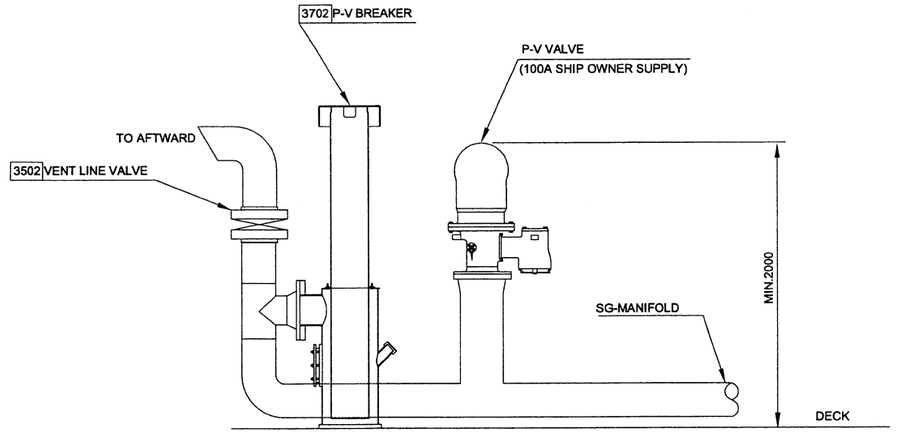
P-V PROTECTION SUB-ASSEMBLY FOR MAIN BALLAST TANK



SPECTACLE FLANGE FOR SG MAIN SUB-ASSEMBLY



P-V PROTECTION SUB-ASSEMBLY FOR A.P. BALLAST TANK

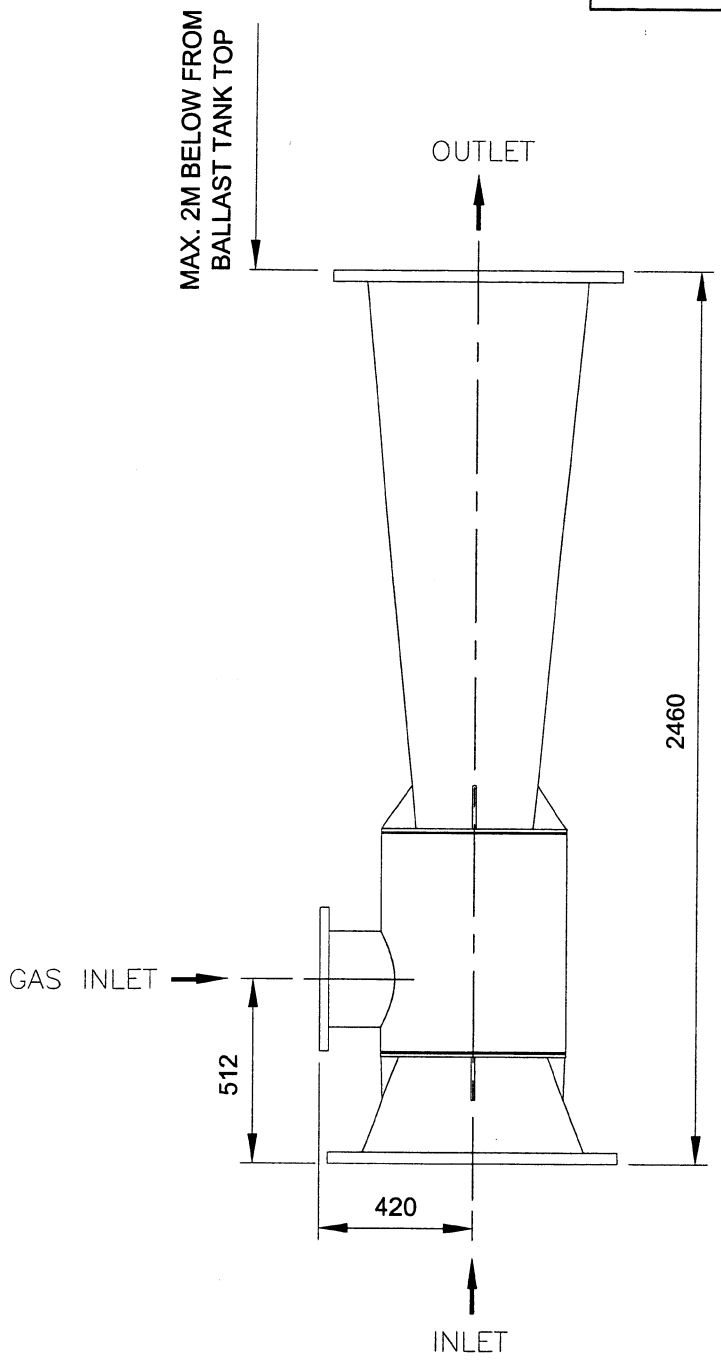


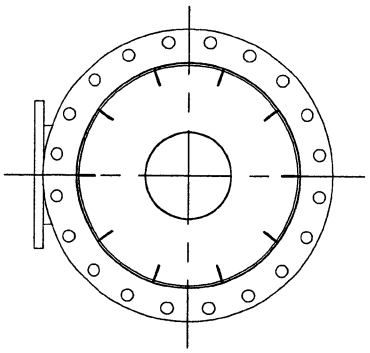
* XXXX MARKED ITEMS ARE SUPPLIED BY SAMGONG VOS.

SAMGONG VOS	DESCRIPTION : SUB-ASSEMBLY DRAWINGS	DATE 10.06.15	BY D.S.Kim	CHECKED U.S.Shon	APPROVED Y.M.Cho
		SCALE NONE	DWG. NO. SV6MD013		REV. △

CONTROL NO. : SH0501V – 33 / 119

TAG NO.
2001-1
2001-2

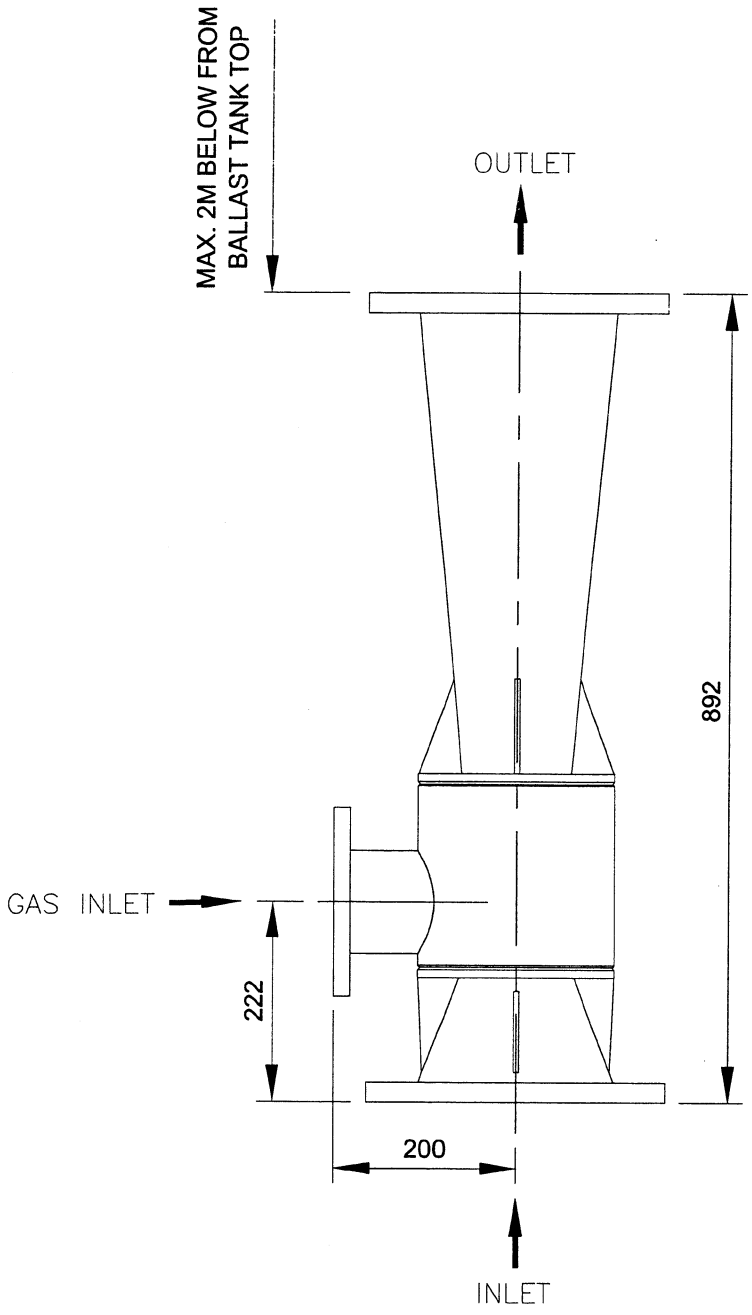




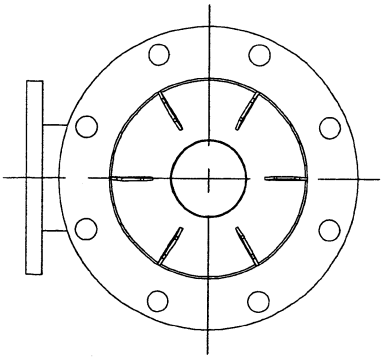
NOTE

1. WATER INLET & OUTLET :
   JIS 5K-600A FLANGE CONNECTION
2. GAS INLET :
   JIS 5K-200A FLANGE CONNECTION
3. MATERIAL OF CONSTRUCTION :
   SUS316L

	DESCRIPTION :	DATE	BY	CHECKED	APPROVED
SAMGONG VOS	VENTURI INJECTOR (FOR MAIN BALLAST)	10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho
		SCALE: NONE	DWG. NO.: SV6MD006		REV.



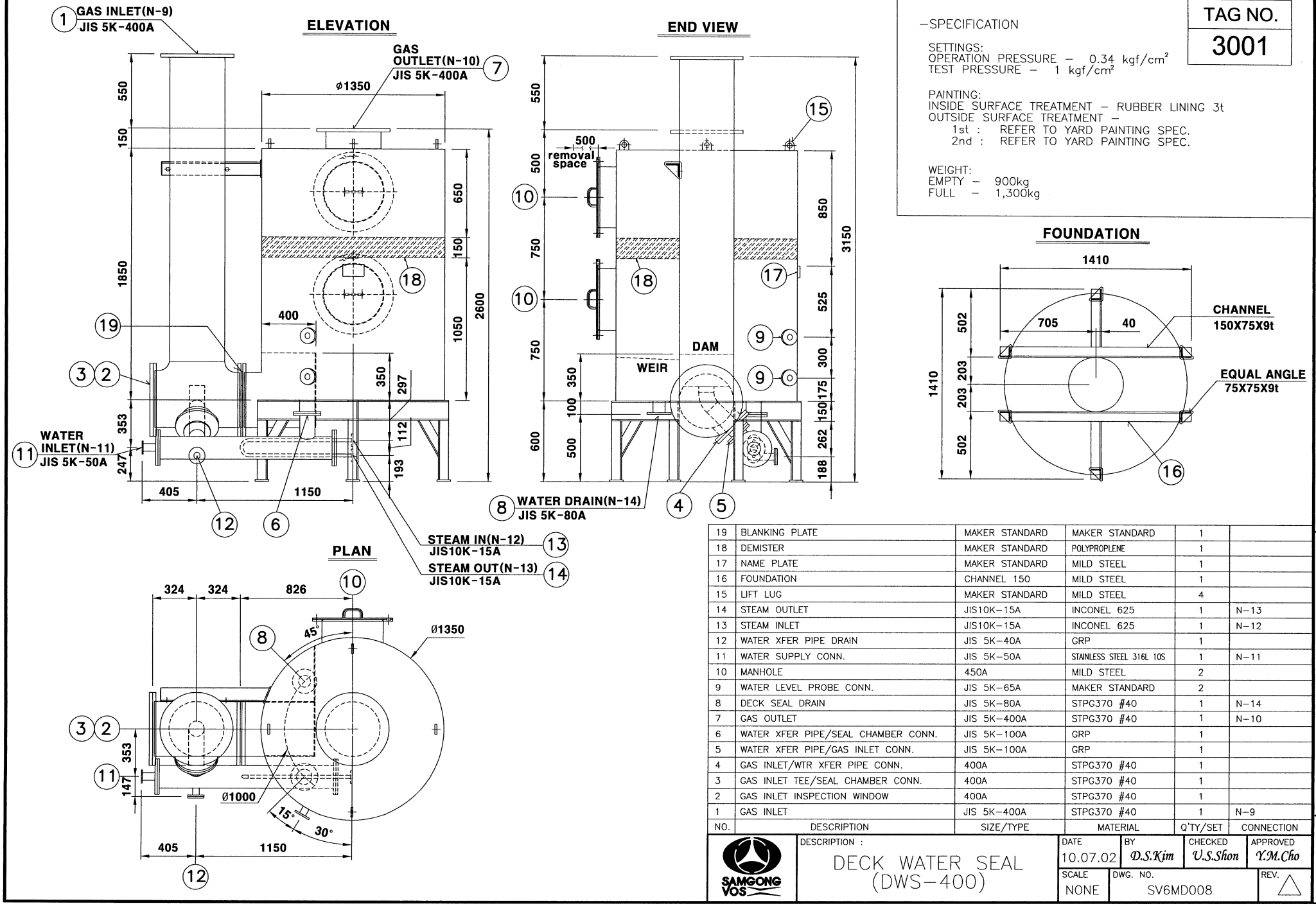
TAG NO.
2101



NOTE

1. WATER INLET & OUTLET :
   JIS 5K-200A FLANGE CONNECTION
2. GAS INLET :
   JIS 5K-80A FLANGE CONNECTION
3. MATERIAL OF CONSTRUCTION :
   SUS316L

SAMGONG VOS	DESCRIPTION : VENTURI INJECTOR (FOR A.P.TANK)	DATE	BY	CHECKED	APPROVED
		10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho
		SCALE	DWG. NO.		REV.
		NONE	SV6MD007		△



-SPECIFICATION

SETTINGS:
OPERATION PRESSURE – 0.34 kgf/cm²
TEST PRESSURE – 1 kgf/cm²

PAINTING:
INSIDE SURFACE TREATMENT – RUBBER LINING 3t
OUTSIDE SURFACE TREATMENT –
1st : REFER TO YARD PAINTING SPEC.
2nd : REFER TO YARD PAINTING SPEC.

WEIGHT:
EMPTY – 900kg
FULL – 1,300kg

TAG NO. 3001

NO.	DESCRIPTION	SIZE/TYPE	MATERIAL	Q'TY/SET	CONNECTION
19	BLANKING PLATE	MAKER STANDARD	MAKER STANDARD	1	
18	DEMISTER	MAKER STANDARD	POLYPROPLENE	1	
17	NAME PLATE	MAKER STANDARD	MILD STEEL	1	
16	FOUNDATION	CHANNEL 150	MILD STEEL	1	
15	LIFT LUG	MAKER STANDARD	MILD STEEL	4	
14	STEAM OUTLET	JIS10K-15A	INCONEL 625	1	N-13
13	STEAM INLET	JIS10K-15A	INCONEL 625	1	N-12
12	WATER XFER PIPE DRAIN	JIS 5K-40A	GRP	1	
11	WATER SUPPLY CONN.	JIS 5K-50A	STAINLESS STEEL 316L 10S	1	N-11
10	MANHOLE	450A	MILD STEEL	2	
9	WATER LEVEL PROBE CONN.	JIS 5K-65A	MAKER STANDARD	2	
8	DECK SEAL DRAIN	JIS 5K-80A	STPG370 #40	1	N-14
7	GAS OUTLET	JIS 5K-400A	STPG370 #40	1	N-10
6	WATER XFER PIPE/SEAL CHAMBER CONN.	JIS 5K-100A	GRP	1	
5	WATER XFER PIPE/GAS INLET CONN.	JIS 5K-100A	GRP	1	
4	GAS INLET/WTR XFER PIPE CONN.	400A	STPG370 #40	1	
3	GAS INLET TEE/SEAL CHAMBER CONN.	400A	STPG370 #40	1	
2	GAS INLET INSPECTION WINDOW	400A	STPG370 #40	1	
1	GAS INLET	JIS 5K-400A	STPG370 #40	1	N-9

SAMGONG VOS

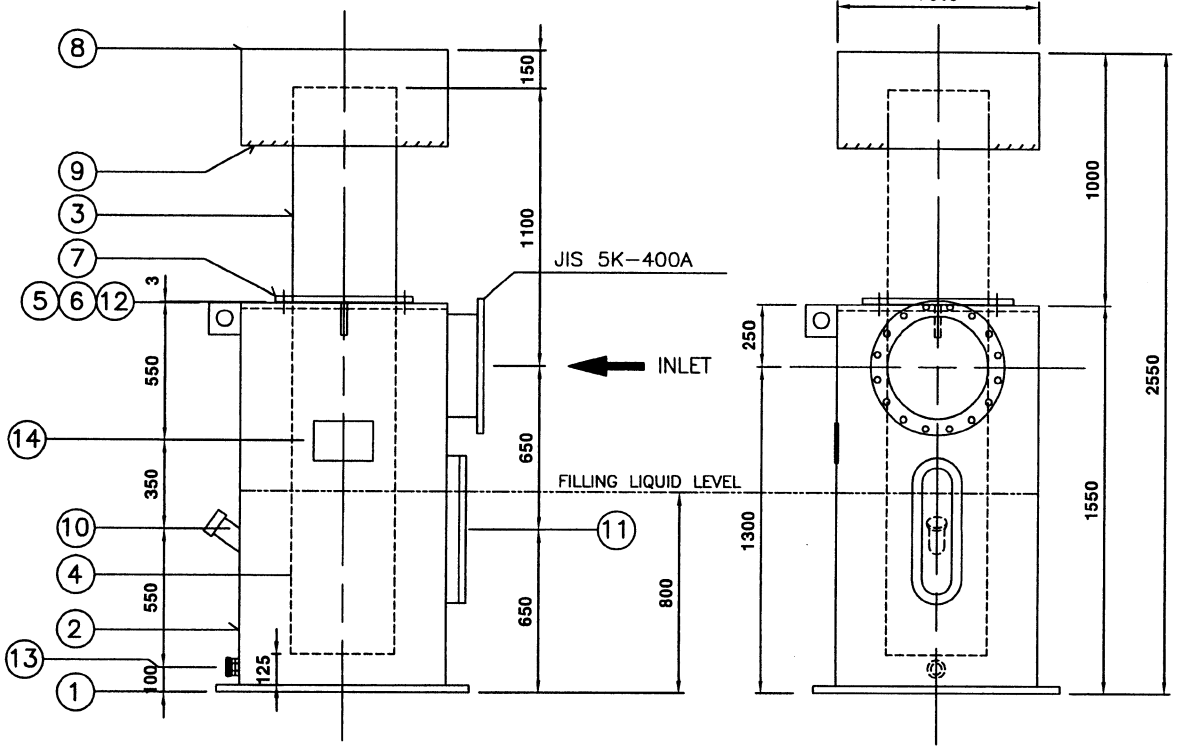
DESCRIPTION :
DECK WATER SEAL
(DWS-400)

DATE	BY	CHECKED	APPROVED
10.07.02	D.S.Kim	U.S.Shon	Y.M.Cho

SCALE	DWG. NO.	REV.
NONE	SV6MD008	△

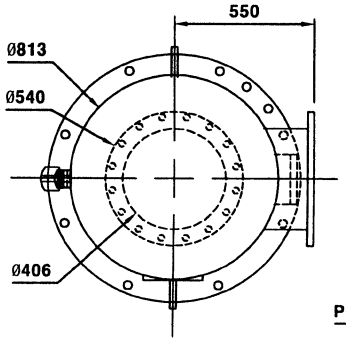
CONTROL NO. : SH0501V – 35 / 119

ELEVATION

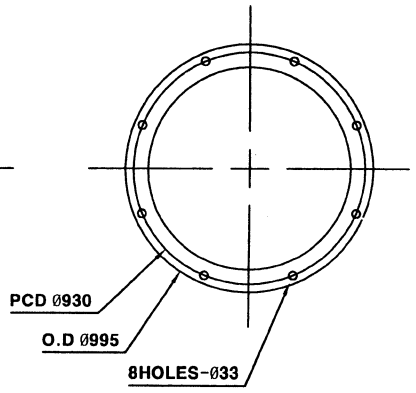


END VIEW

PLAN



FOUNDATION



-SPECIFICATION

TAG NO. 3201

SETTINGS:
PRESSURE - 0.21kgf/cm² (max)
VACUUM - 0.07kgf/cm² (max)

FILLING LIQUID:
25% - ETHLENE GLYCOL
75% - FRESH WATER
DENSITY - 1.07 kg/ltr

PAINTING:
INSIDE SURFACE TREATMENT - RUBBER LINING 3t
OUTSIDE SURFACE TREATMENT -
1st : REFER TO YARD PAINTING SPEC.
2nd : REFER TO YARD PAINTING SPEC.

WEIGHT:
EMPTY - 600 kg
FULL - 800 kg

-NOTE

AT MAXIMUM AIR OR GAS FLOW THE VOS PV-BREAKER DOES NOT EXCEED 25% OF THE MAXIMUM ΔP.
IN MOST CASES THE ΔP IS LESS THAN 10% OF THE MAXIMUM.

NO.	DESCRIPTION	SIZE/TYPE	MATERIAL	Q'TY/SET	REMARK
14	NAME PLATE	MAKER STANDARD	STAINLESS STEEL 304L	1	
13	DRAIN PLUG	25A	STAINLESS STEEL 316L	1	WITH CAP
12	LIFTING LUG	MAKER STANDARD	MILD STEEL	3	
11	SIGHT GLASS WITH PROTECTION	MAKER STANDARD	STAINLESS STEEL 316L	1	WITH HARD GLASS
10	FILLING/LEVEL	50A THREAD	STAINLESS STEEL 316L	1	WITH CAP
9	FLAME SCREEN	MAKER STANDARD	STAINLESS STEEL 316L	1	30 MESH
8	STACK COVER	O.D ø813	STPG370 #40	1	
7	FLANGE WITH BOLT/NUT	JIS 5K-400A	STAINLESS STEEL 316L	1	
6	GASKET	JIS 5K-400A	NEOPRENE 3t	1	
5	PLATE WITH STUD BOLT	O.D ø813	MILD STEEL/SUS 316L	1/16	M22 STUD BOLT
4	INNER PIPE	400A	STPG370 #40	1	
3	VENT STACK	400A	STPG370 #40	1	
2	MAIN BODY	800A	STPG370 #40	1	
1	FOUNDATION(BLANK FLANGE)	JIS 5K-800A	MILD STEEL	1	

SAMGONG VOS

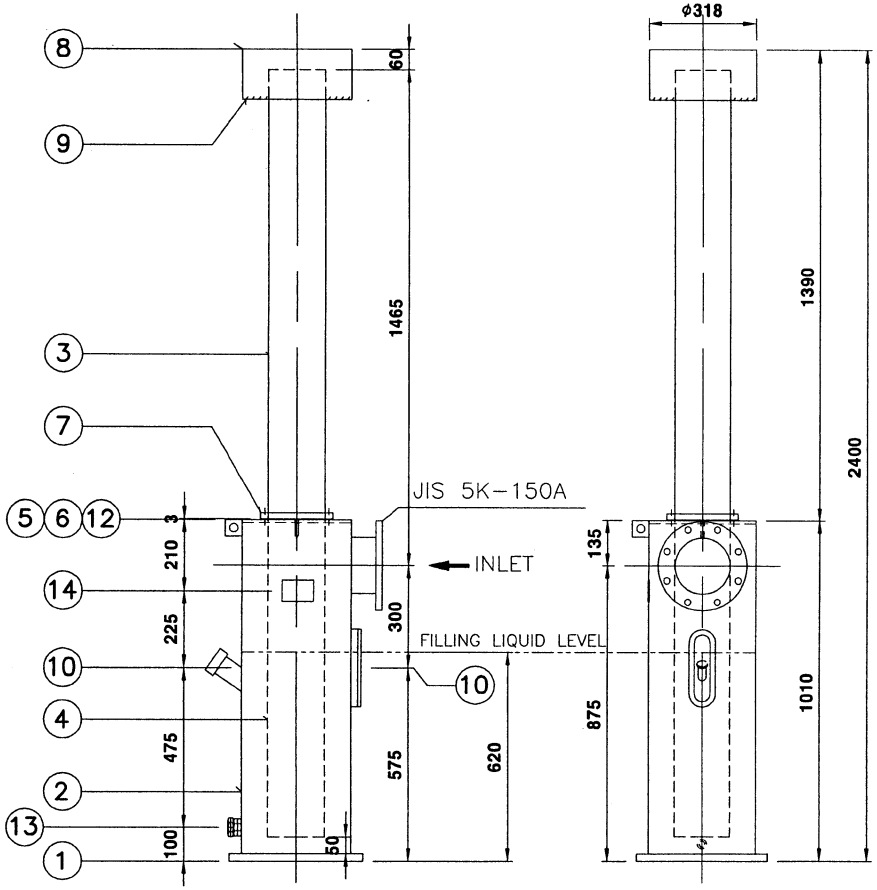
DESCRIPTION :
P-V BREAKER (FOR MAIN BALLAST)

DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho

SCALE	DWG. NO.	REV.
NONE	SV6MD009	△

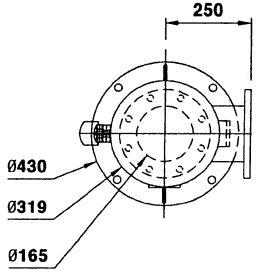
CONTROL NO. : SH0501V - 36 / 119

ELEVATION

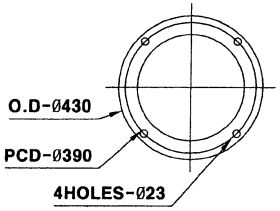


END VIEW

PLAN



FOUNDATION



-SPECIFICATION

SETTINGS:
PRESSURE - 0.21kgf/cm² (max)
VACUUM - 0.07kgf/cm² (max)

FILLING LIQUID:
25% - ETHLENE GLYCOL
75% - FRESH WATER
DENSITY - 1.07 kg/ltr

PAINTING:
INSIDE SURFACE TREATMENT - RUBBER LINING 3t
OUTSIDE SURFACE TREATMENT -
1st : REFER TO YARD PAINTING SPEC.
2nd : REFER TO YARD PAINTING SPEC.

WEIGHT:
EMPTY - 140 kg
FULL - 200 kg

-NOTE

AT MAXIMUM AIR OR GAS FLOW THE VOS PV-BREAKER DOES NOT EXCEED 25% OF THE MAXIMUM ΔP.
IN MOST CASES THE ΔP IS LESS THAN 10% OF THE MAXIMUM.

TAG NO.
3202

NO.	DESCRIPTION	SIZE/TYPE	MATERIAL	Q'TY/SET	REMARK
14	NAME PLATE	MAKER STANDARD	STAINLESS STEEL 304L	1	
13	DRAIN PLUG	25A	STAINLESS STEEL 316L	1	WITH CAP
12	LIFTING LUG	MAKER STANDARD	MILD STEEL	3	
11	SIGHT GLASS WITH PROTECTION	MAKER STANDARD	STAINLESS STEEL 316L	1	WITH HARD GLASS
10	FILLING/LEVEL	50A THREAD	STAINLESS STEEL 316L	1	WITH CAP
9	FLAME SCREEN	MAKER STANDARD	STAINLESS STEEL 316L	1	30 MESH
8	STACK COVER	O.D ø318.5	STPG370 #40	1	
7	FLANGE WITH BOLT/NUT	JIS 5K-150A	STAINLESS STEEL 316L	1	
6	GASKET	JIS 5K-150A	NEOPRENE 3t	1	
5	PLATE WITH STUD BOLT	O.D ø318.5	MILD STEEL/SUS 316L	1/12	M20 STUD BOLT
4	INNER PIPE	150A	STPG370 #40	1	
3	VENT STACK	150A	STPG370 #40	1	
2	MAIN BODY	300A	STPG370 #40	1	
1	FOUNDATION(BLANK FLANGE)	JIS 5K-300A	MILD STEEL	1	

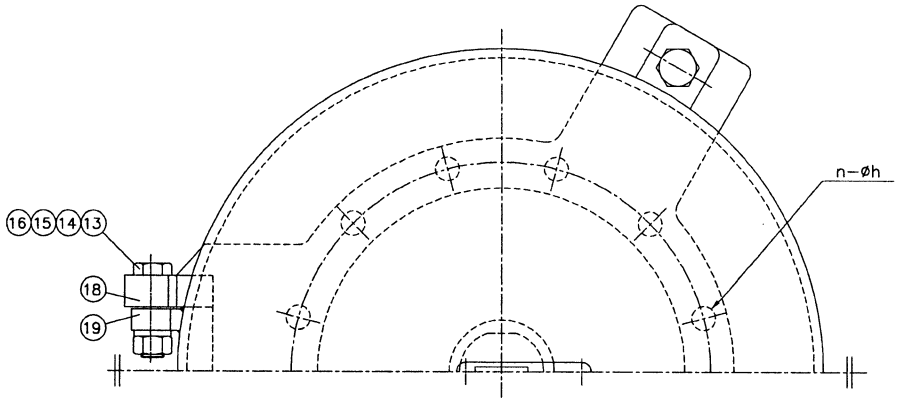
SAMGONG VOS

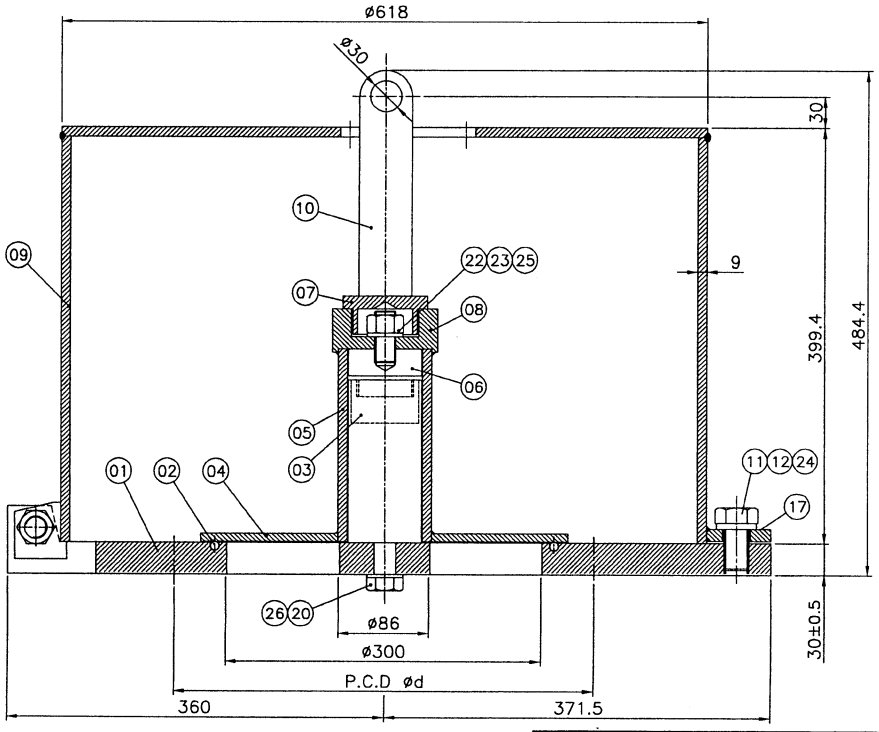
DESCRIPTION :
P-V BREAKER
(FOR A.P.TANK)

DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	V.S.Shon	Y.M.Cho

SCALE	DWG. NO.	REV.
NONE	SV6MD010	△

CONTROL NO. : SH0501V - 37 / 119





APPLICATION

1. SETTING PRESSURE : 0.17 ± 0.015 Kgf/cm^2

DIMENSIONS TABLE

TYPE	P.C.D ød	n-øh
JIS 10K	ø400 ±0.5	16-ø25
DIN 10BAR	ø400 ±0.5	12-ø23
ANSI 150LBS	ø432 ±0.5	12-ø25

TAG NO.
3401
35 EA

NO.	NAME	MATERIAL	Q'TY	PART NO.	REMARK
26	WASHER	SUS316	1	MRVV-SA-250-26	M22
25	WASHER	SUS316	1	MRVV-SA-250-25	M20
24	PACKING	NBR	2	MRVV-SA-300-24	
23	TEFLON NUT	SUS304	1	MRVV-SA-250-23	M20 x P1.0
22	SET SCREW	SUS304	1	MRVV-SA-250-22	M20 x P1.0 x L50
20	HEX BOLT	SUS304	1	MRVV-SA-150-20	M20 x P2.5 x L60
19	HINGE2	SUS316	2	MRVV-SA-250-19	
18	HINGE1	SUS316	2	MRVV-SA-250-18	
17	LOCKING PLATE	SUS316	2	MRVV-SA-300-17	
16	HEX NUT	SUS304	2	MRVV-SA-100-16	M22 x P2.0
15	SPRING WASHER	SUS316	2	MRVV-SA-100-15	M22
14	PACKING	NBR	2	MRVV-SA-100-14	
13	HEX BOLT	SUS304	2	MRVV-SA-100-13	M22 x P2.0 x L80
12	SPRING WASHER	SUS316	2	MRVV-SA-300-12	M24
11	HEX BOLT	SUS304	2	MRVV-SA-300-11	M24 x P3.0 x L45
10	MANUAL OVERRIDE BAIL	SUS316	1	MRVV-SA-300-10	
09	COVER	SS400	1	MRVV-SA-300-09	EPOXY COATING
08	PIPE CAP	SUS316	1	MRVV-SA-250-08	
07	PIPE PLUG	SUS316	1	MRVV-SA-250-07	
06	IRON KEEPER	SS400	1	MRVV-SA-250-06	URETHANE COATING
05	GUIDE PIPE	SUS316	1	MRVV-SA-300-05	
04	SEALING FLANGE	SUS316	1	MRVV-SA-300-04	
03	MAGNET ASS'Y	-	1	MRVV-SA-300-03	
02	O-RING	SILICONE	1	MRVV-SA-300-02	
01	MOUNTING FLANGE	SUS316L	1	MRVV-SA-300-01	JIS 10K-300A

SAMGONG VOS

DESCRIPTION :

MAGNET VENT CHECK VALVE (MAGNETIC RELIEF VALVE)

DATE	BY	CHECKED	APPROVED
10.06.25	D.S.Kim	U.S.Shon	Y.M.Cho

SCALE	DWG. NO.	REV.
NONE	SV6MD011	△

CONTROL NO. : SH0501V - 38 / 119

2. ELECTRIC DRAWINGS

SAMGONG VOS

DESCRIPTION : ELECTRIC DRAWING LIST

DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho

SCALE	DWG. NO.	REV.
NONE	SV6ED001	△

CLIENT : HYUNDAI SAMHO INDUSTRIES CO., LTD.

PJT. NAME (SHIP NO.) : S501/502, S556/557

1. SUPPLY LIST

NO.	SERVICE	TYPE
1	MAIN CONTROL PANEL	
2	MOTOR STARTER PANEL	
3	BALLAST WATER TREATMENT(BWT) CONTROL PANEL	LARGE SCREEN (12")
4	ALARM PANEL	SMALL SCREEN (6")
5	GAS ANALYZER PANEL	
6	VIDEOGRAPHIC(DATA) RECORDER PANEL	

2. SPECIFICATIONS

Class of Ship	ABS
Power Source	AC 440 V, 60 Hz, 3 Phase

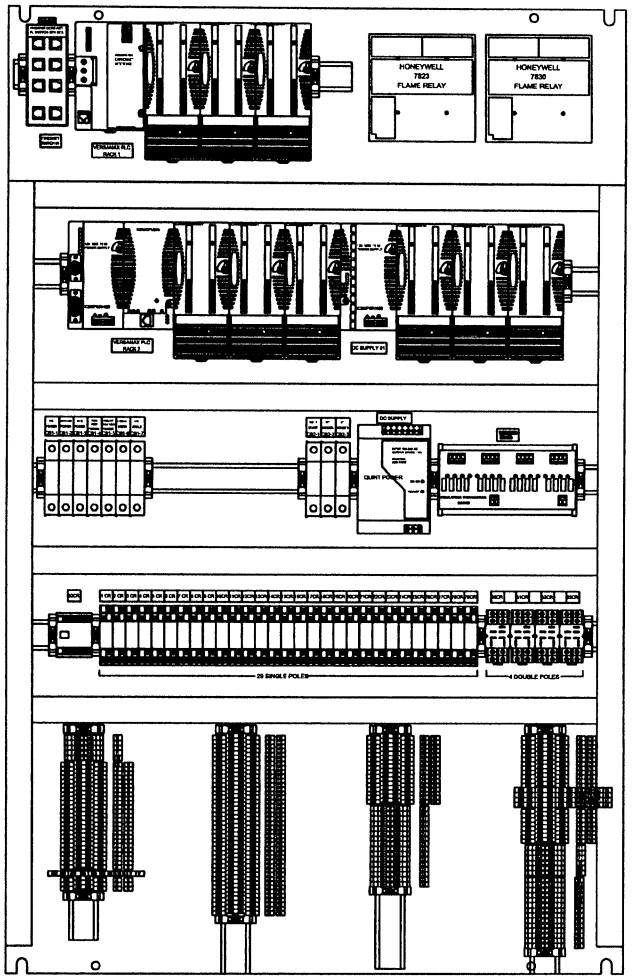
SAMGONG VOS

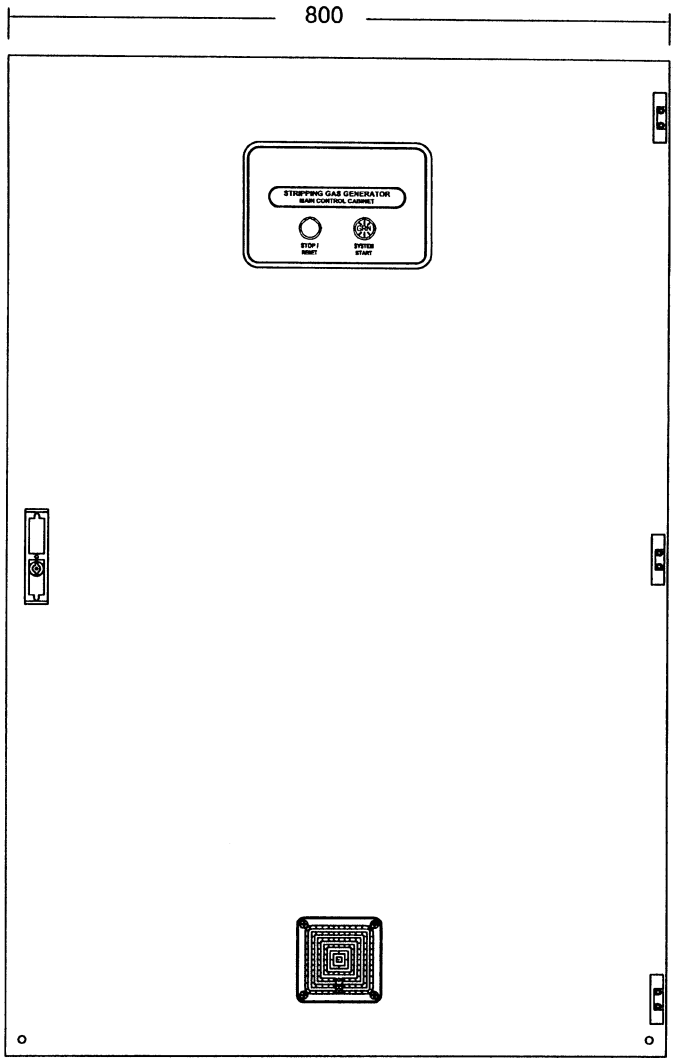
DESCRIPTION : ELECTRIC DRAWING COVER

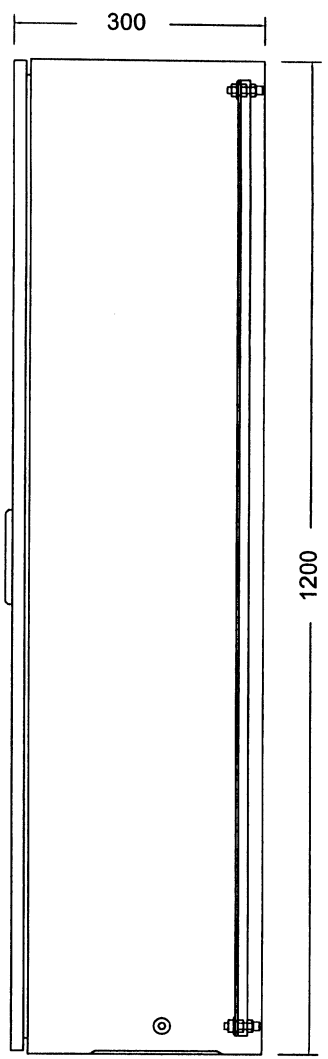
DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho

SCALE	DWG. NO.	REV.
NONE	SV6ED002	△

CONTROL NO. : SH0501V - 40 / 119







4001

SAMGONG VOS

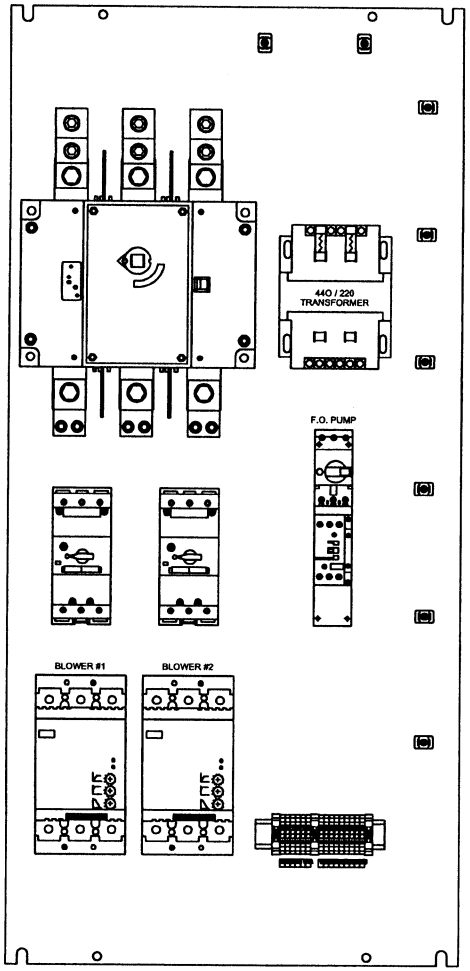
DESCRIPTION :

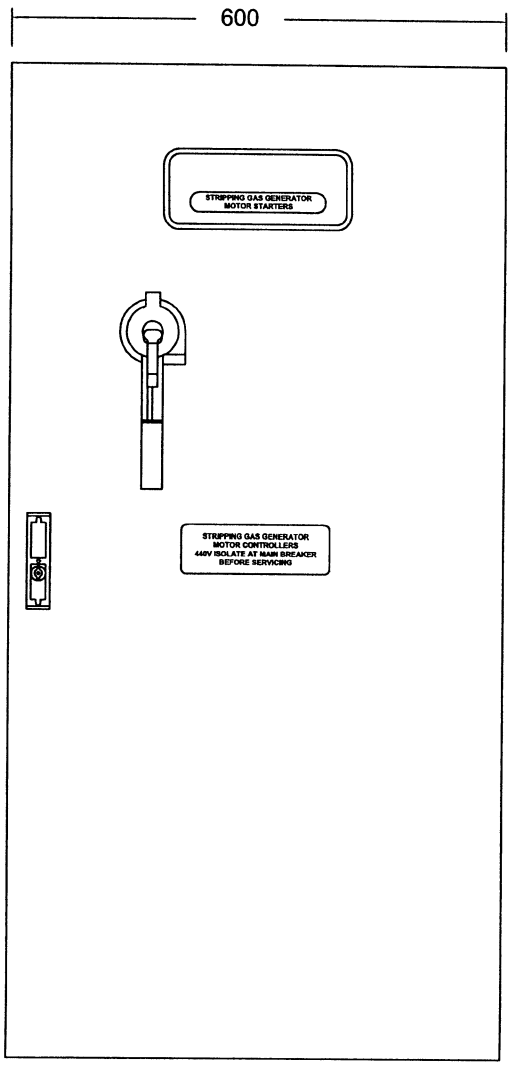
LAYOUT OF
MAIN CONTROL PANEL

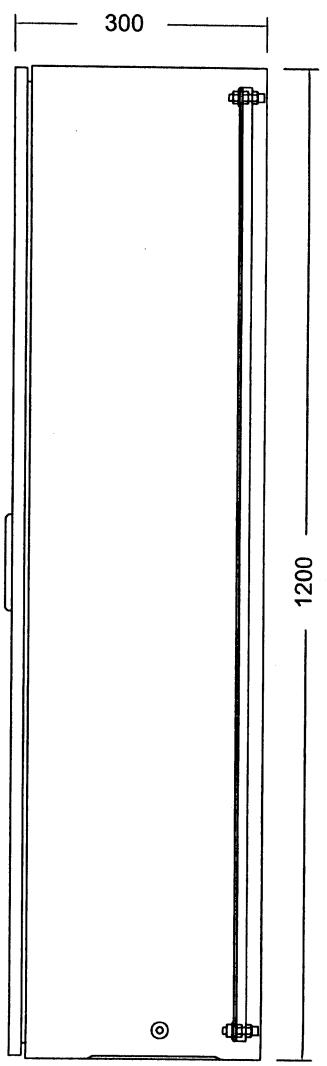
DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho

SCALE	DWG. NO.	REV.
NONE	SV6ED003	△

CONTROL NO. : SH0501V – 41 / 119







4001

CONTROL NO. : SH0501V – 42 / 119

SAMGONG VOS

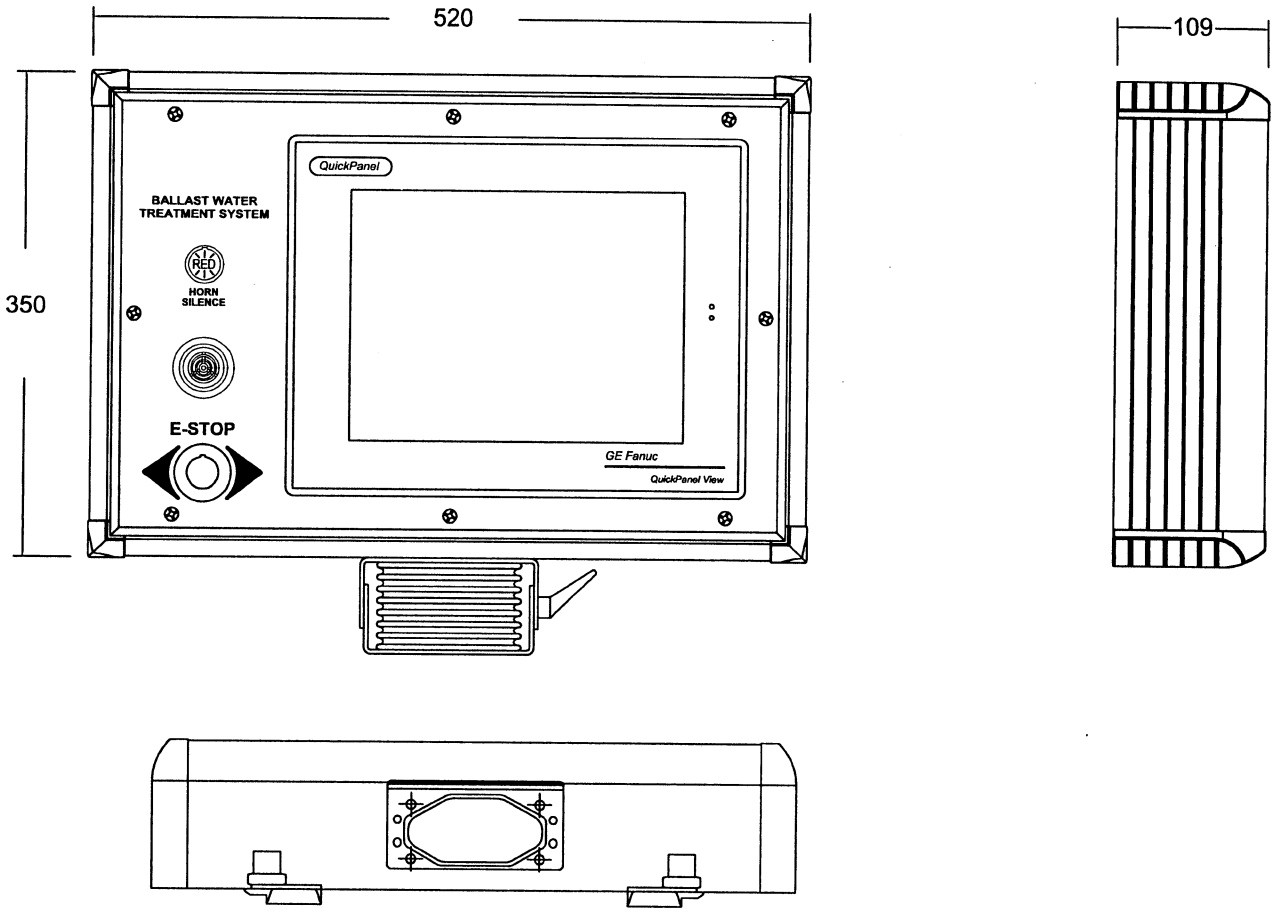
DESCRIPTION :

LAYOUT OF
MOTOR STARTER PANEL

DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	V.S.Shon	Y.M.Cho

SCALE	DWG. NO.	REV.
NONE	SV6ED004	△

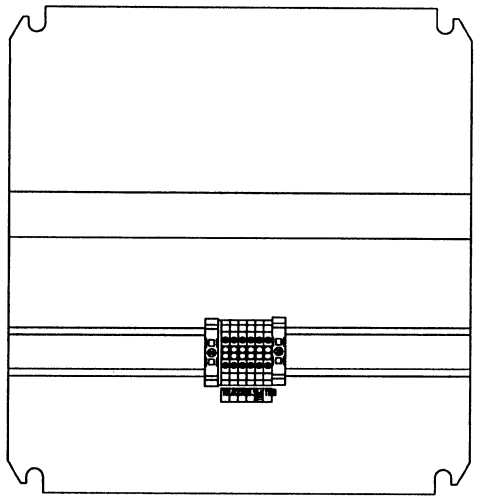
4003

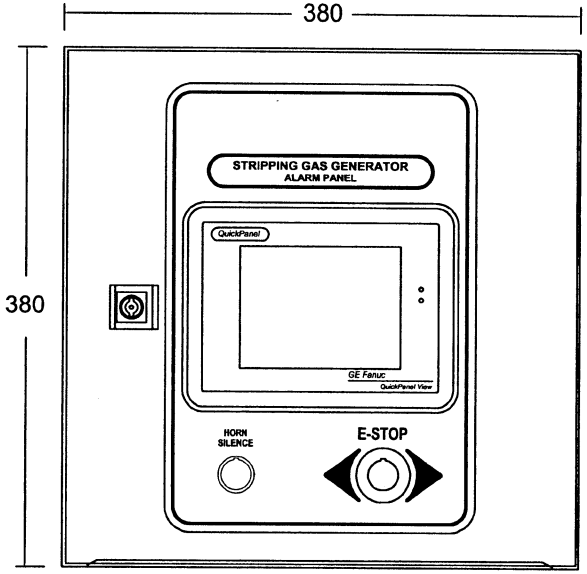


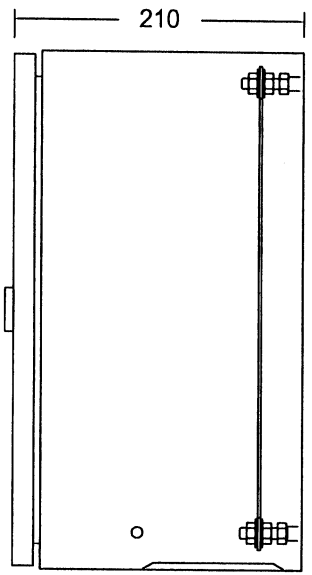
	DESCRIPTION :	DATE	BY	CHECKED	APPROVED
SAMGONG VOS	LAYOUT OF BALLAST WATER TREATMENT CONTROL PANEL	10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho
		SCALE: NONE	DWG. NO.: SV6ED005	REV.	

CONTROL NO. : SH0501V – 43 / 119

4002

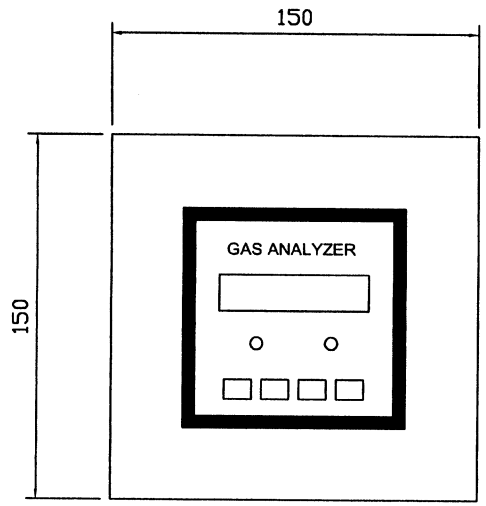


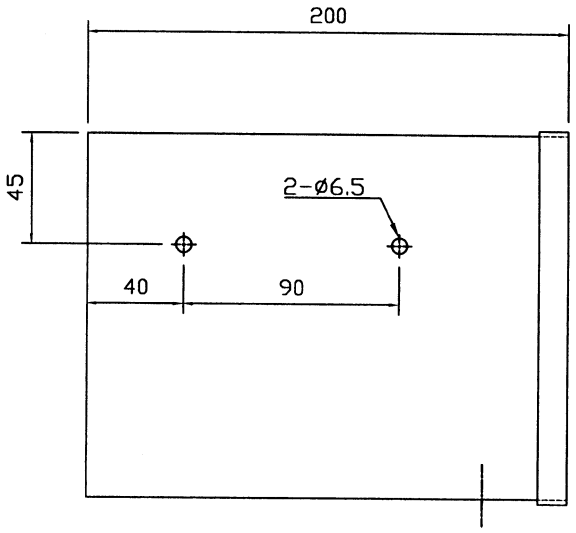




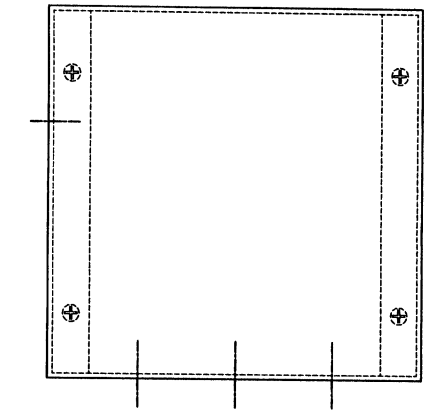
CONTROL NO. : SH0501V - 44 / 119

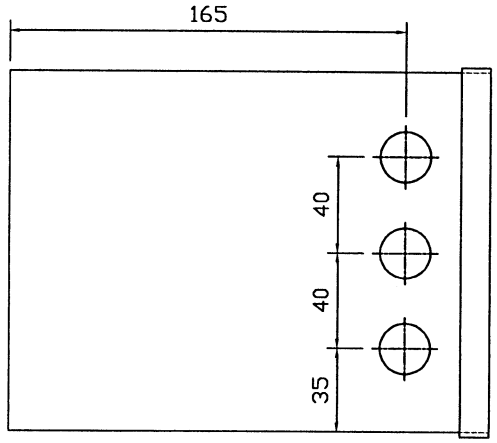
SAMGONG VOS	DESCRIPTION : LAYOUT OF ALARM PANEL	DATE 10.06.15	BY D.S.Kim	CHECKED V.S.Shon	APPROVED Y.M.Cho
		SCALE NONE	DWG. NO. SV6ED006		REV. △





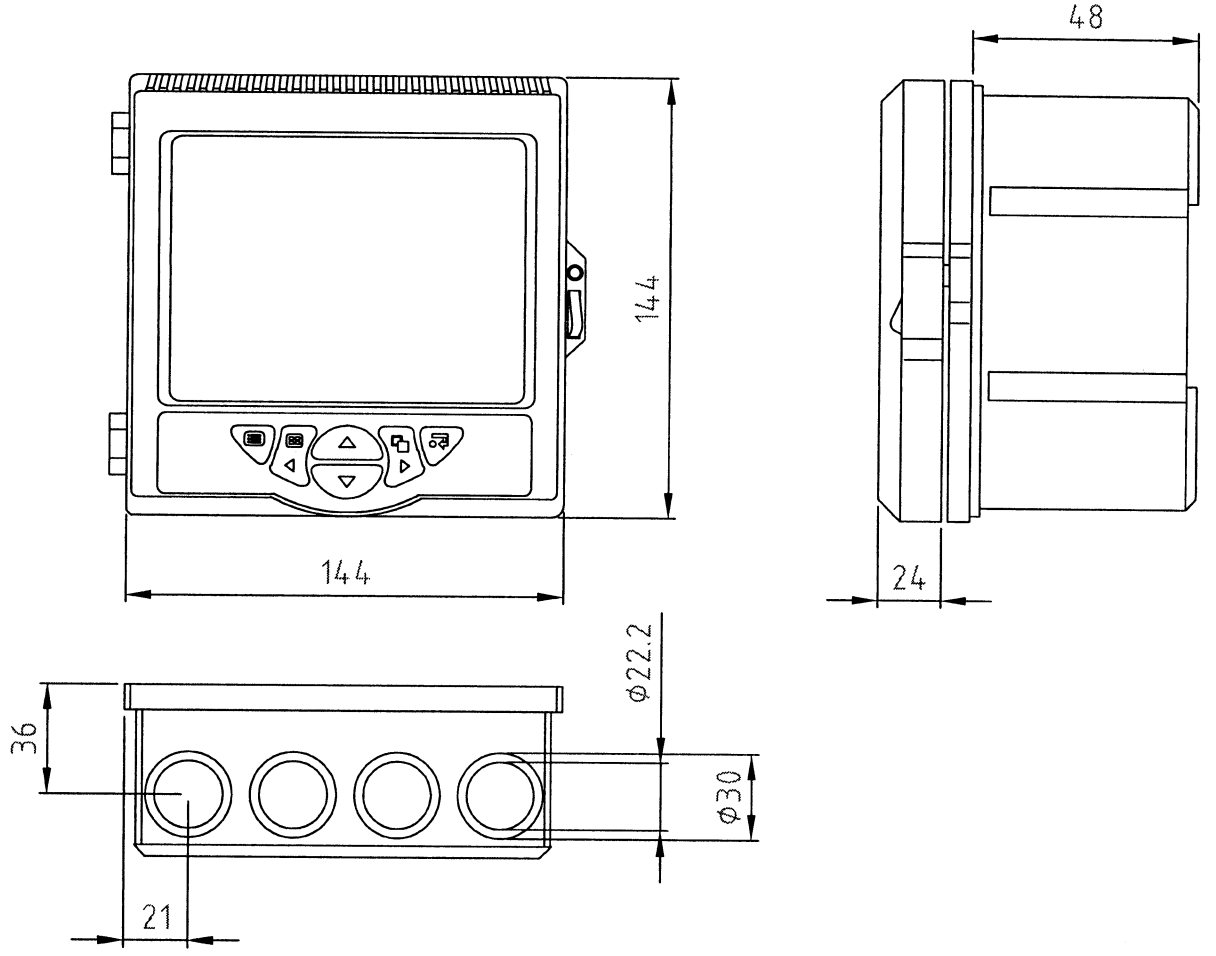
4005





SAMGONG VOS	DESCRIPTION : LAYOUT OF GAS ANALYZER PANEL	DATE 10.06.15	BY D.S.Kim	CHECKED U.S.Shon	APPROVED Y.M.Cho
		SCALE NONE	DWG. NO. SV6ED007		REV. △

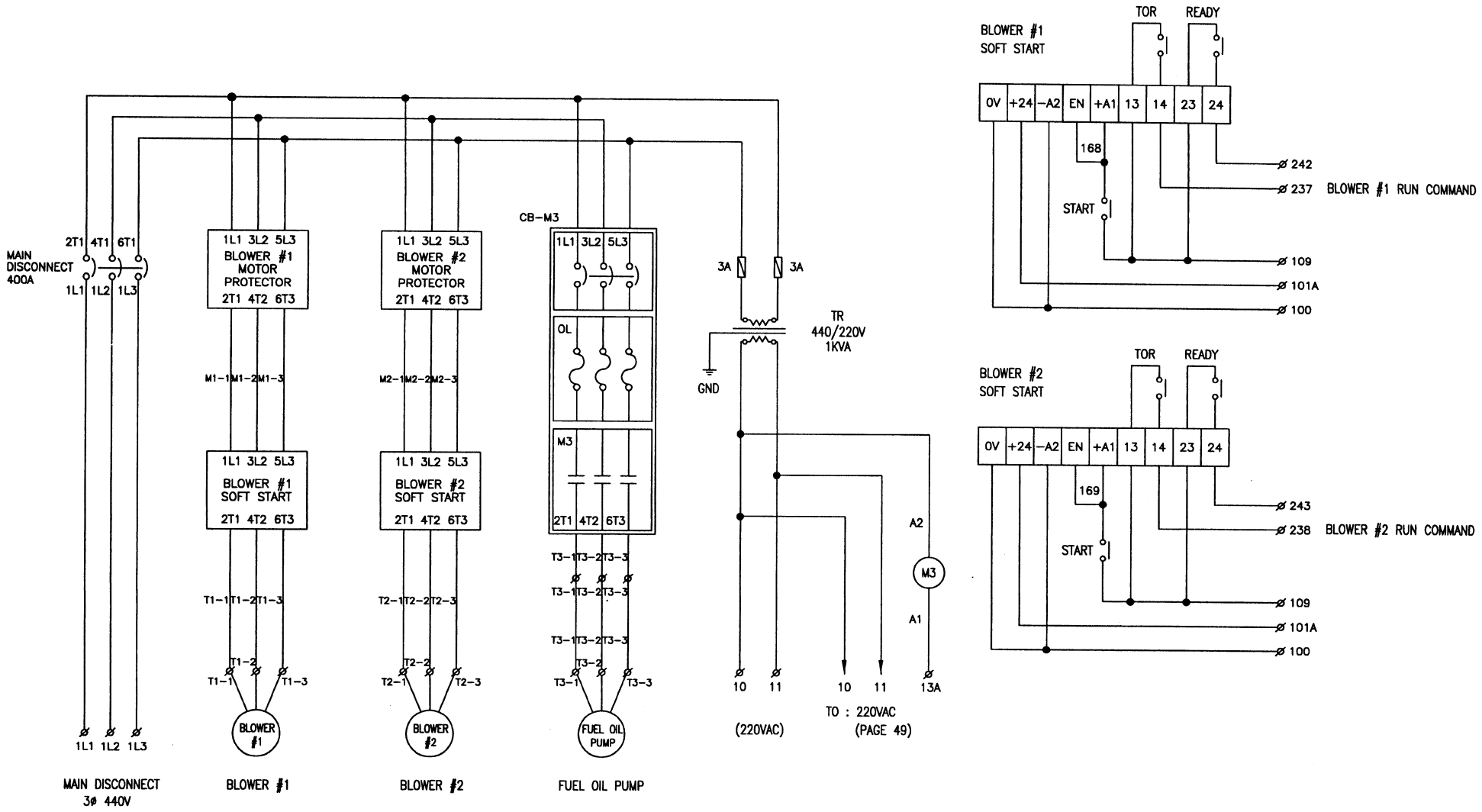
CONTROL NO. : SH0501V – 45 / 119



4004

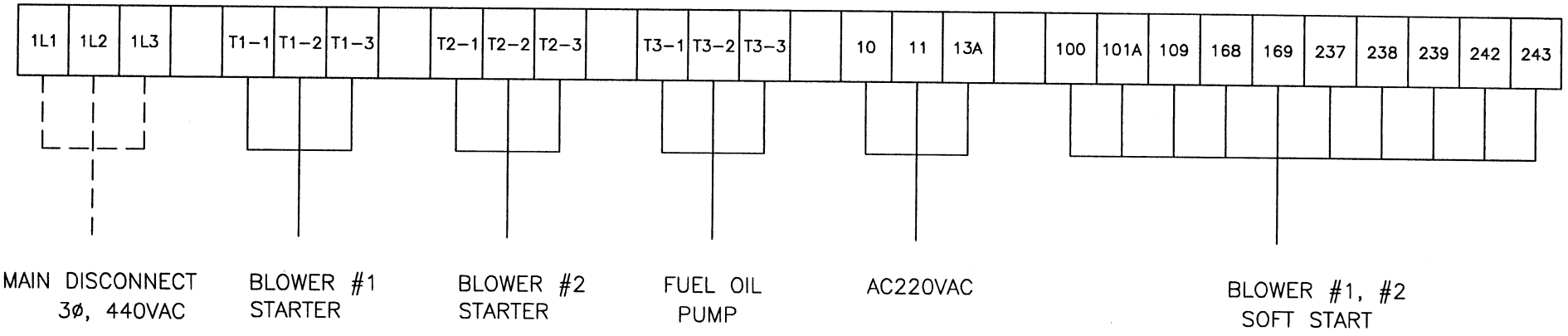
SAMGONG VOS	DESCRIPTION : LAYOUT OF VIDEOGRAPHIC RECORDER PANEL (DATA RECORDER PANEL)	DATE 10.06.15	BY D.S.Kim	CHECKED U.S.Shon	APPROVED Y.M.Cho
		SCALE NONE	DWG. NO. SV6ED008		REV. △

CONTROL NO. : SH0501V – 46 / 119



SAMGONG VOS	DESCRIPTION : MAIN CONNECT OF MOTOR STARTER PANEL	DATE 10.06.15	BY D.S.Kim	CHECKED U.S.Shon	APPROVED Y.M.Cho
		SCALE NONE	DWG. NO. SV6ED009	REV. △	

CONTROL NO. : SH0501V - 47 / 119



SAMGONG VOS

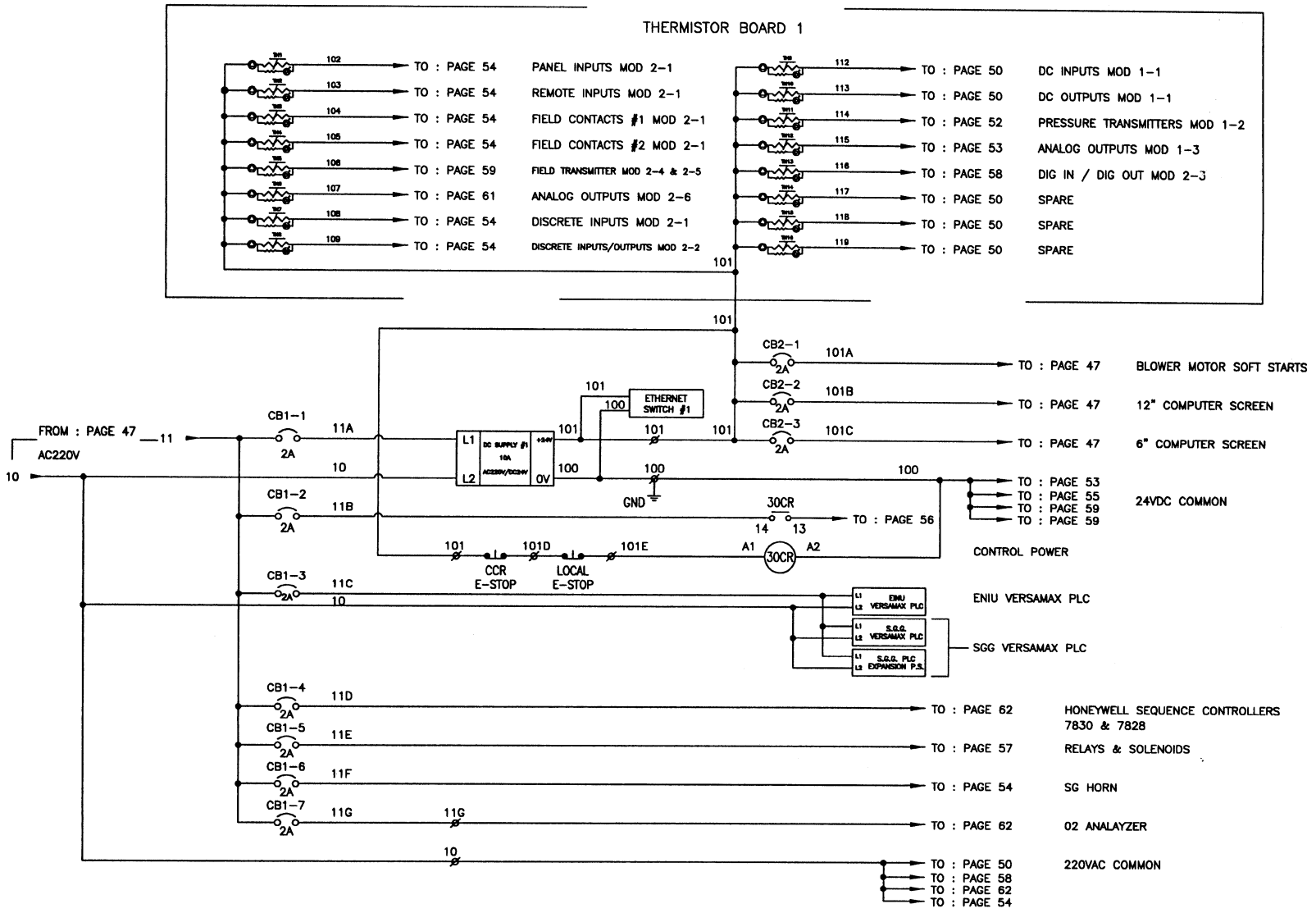
DESCRIPTION :

MAIN DISCONNECT
TERMINAL BLOCK
OF MOTOR STARTER PANEL

DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	V.S.Shon	Y.M.Cho

SCALE	DWG. NO.	REV.
NONE	SV6ED010	△

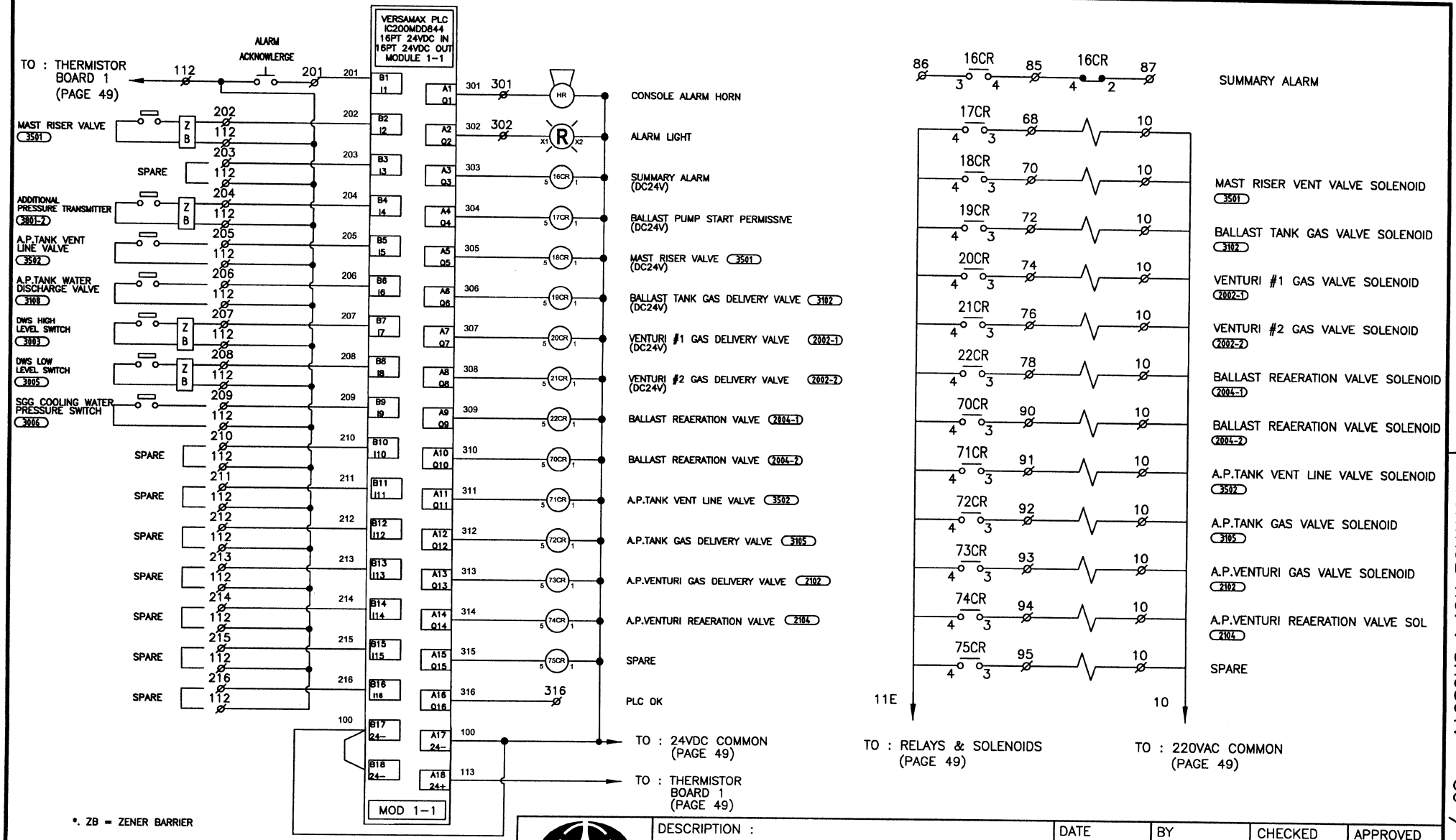
CONTROL NO. : SH0501V - 48 / 119



SAMGONG VOS

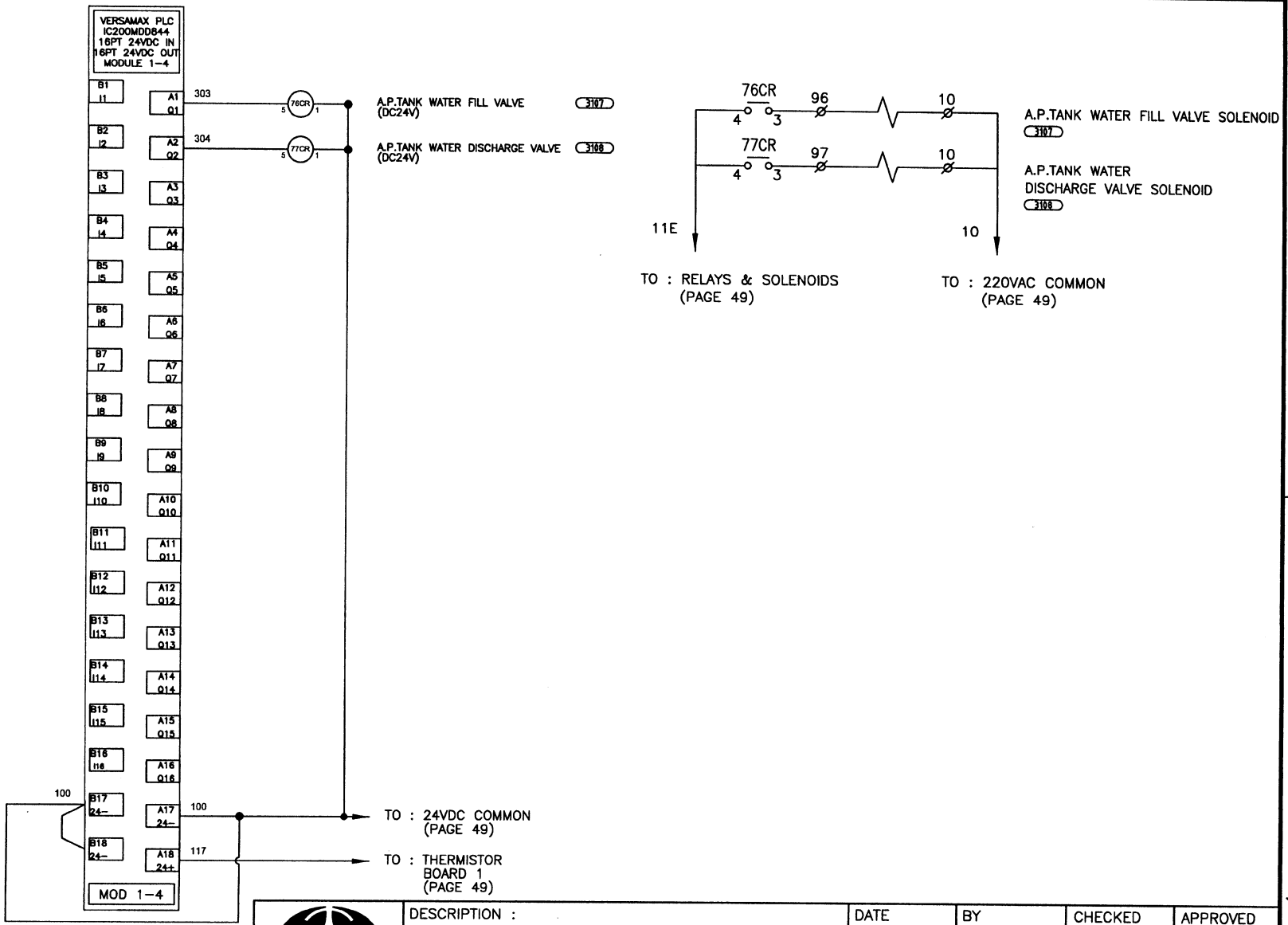
DESCRIPTION :	DATE	BY	CHECKED	APPROVED
MAIN CONTROL PANEL	10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho
	SCALE: NONE	DWG. NO.: SV6ED011	REV.	

CONTROL NO. : SH0501V - 49 / 119



SAMGONG VOS	DESCRIPTION : MAIN CONTROL PANEL PLC MODULE 1-1	DATE 10.06.15	BY D.S.Kim	CHECKED U.S.Shon / APPROVED Y.M.Cho
		SCALE NONE	DWG. NO. SV6ED012	REV. △

CONTROL NO. : SH0501V - 50 / 119



SAMGONG VOS

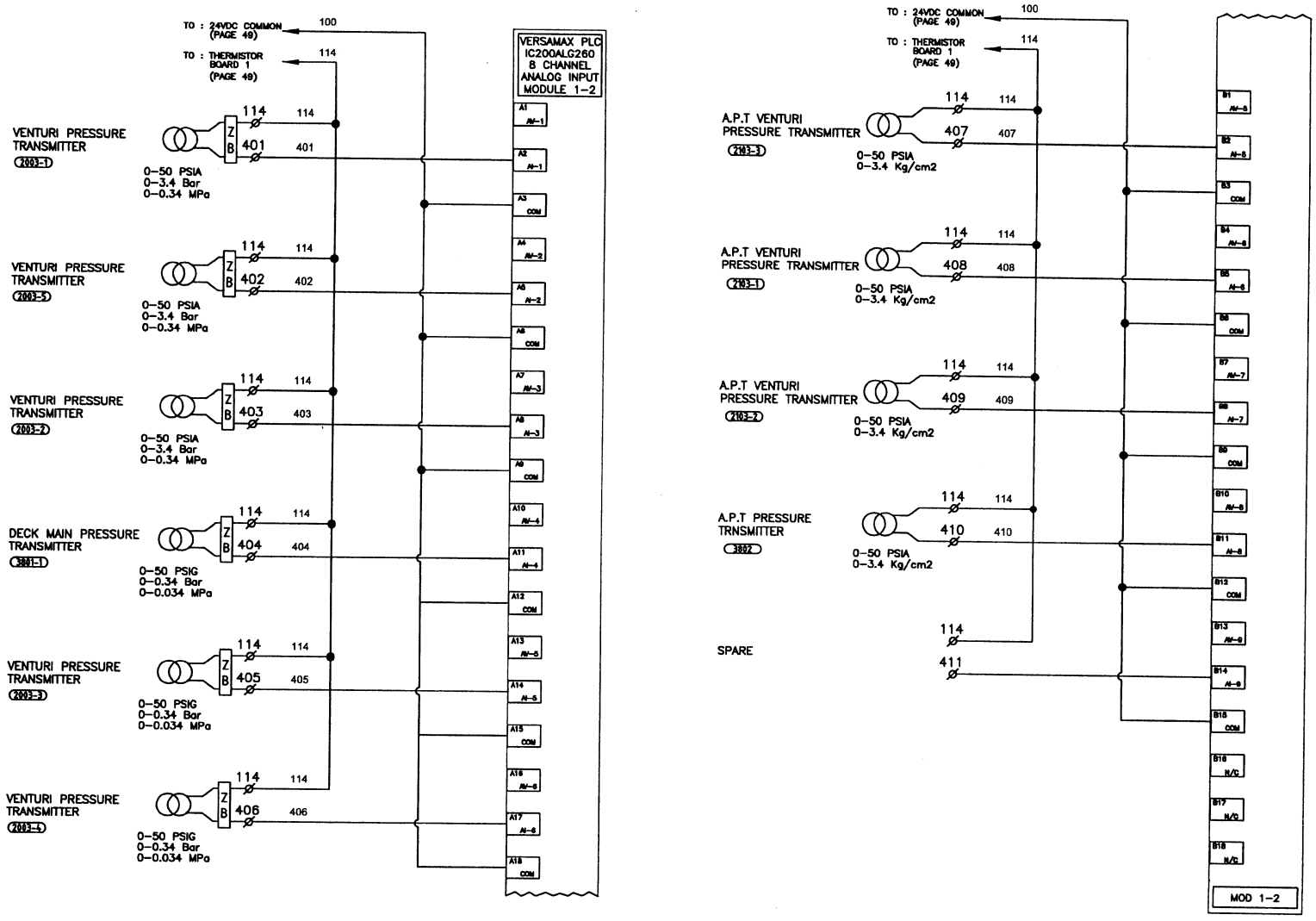
DESCRIPTION :

MAIN CONTROL PANEL
PLC MODULE 1-4

DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho

SCALE	DWG. NO.	REV.
NONE	SV6ED012	△

CONTROL NO. : SH0501V - 51 / 119

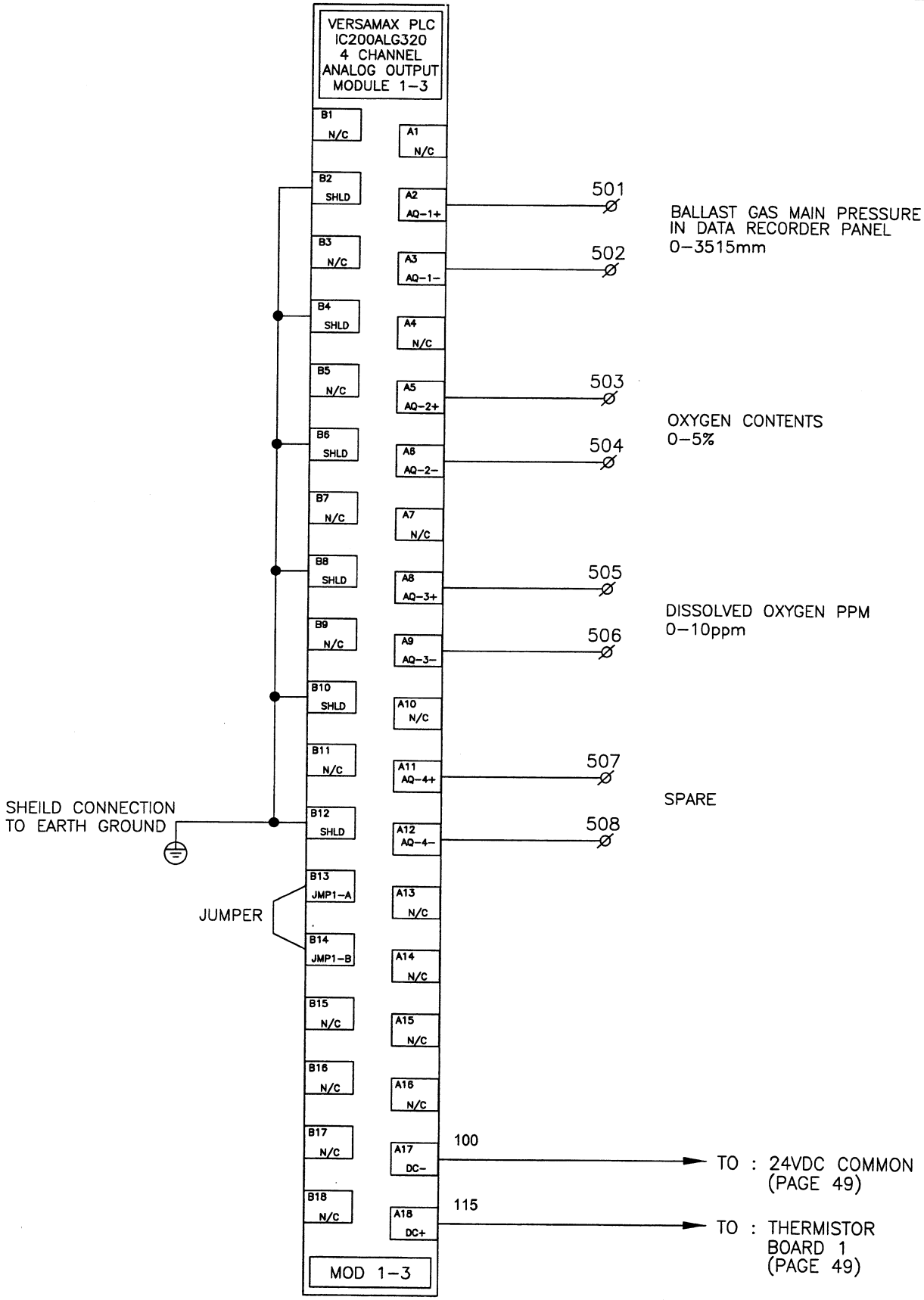


*. ZB = ZENER BARRIER

SAMGONG VOS	DESCRIPTION : MAIN CONTROL PANEL PLC MODULE 1-2	DATE 10.06.15	BY D.S.Kim	CHECKED U.S.Shon	APPROVED Y.M.Cho
		SCALE NONE	DWG. NO. SV6ED003		REV. △

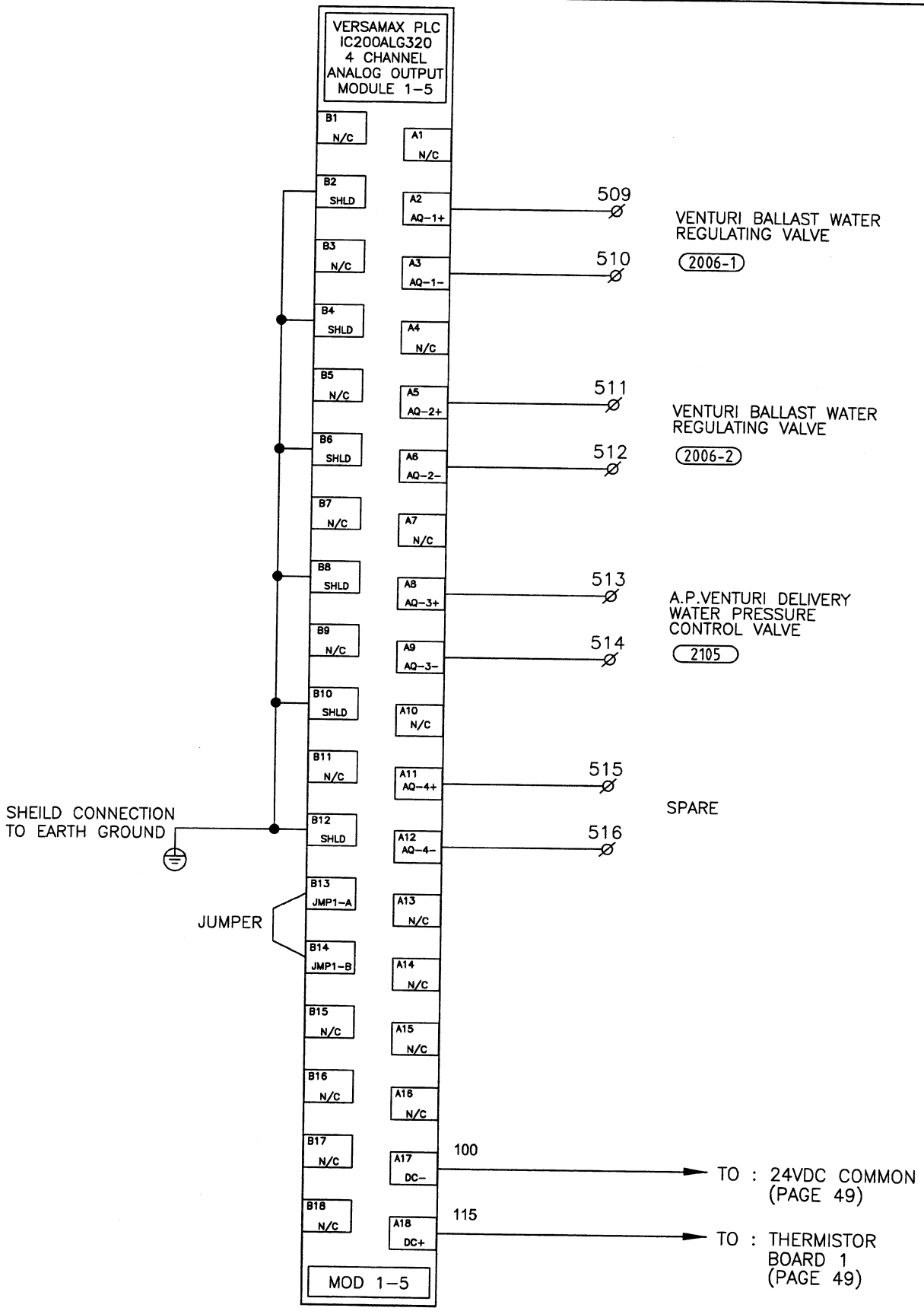
CONTROL NO. : SH0501V - 52 / 119

CONTROL NO. : SH0501V – 53 / 119

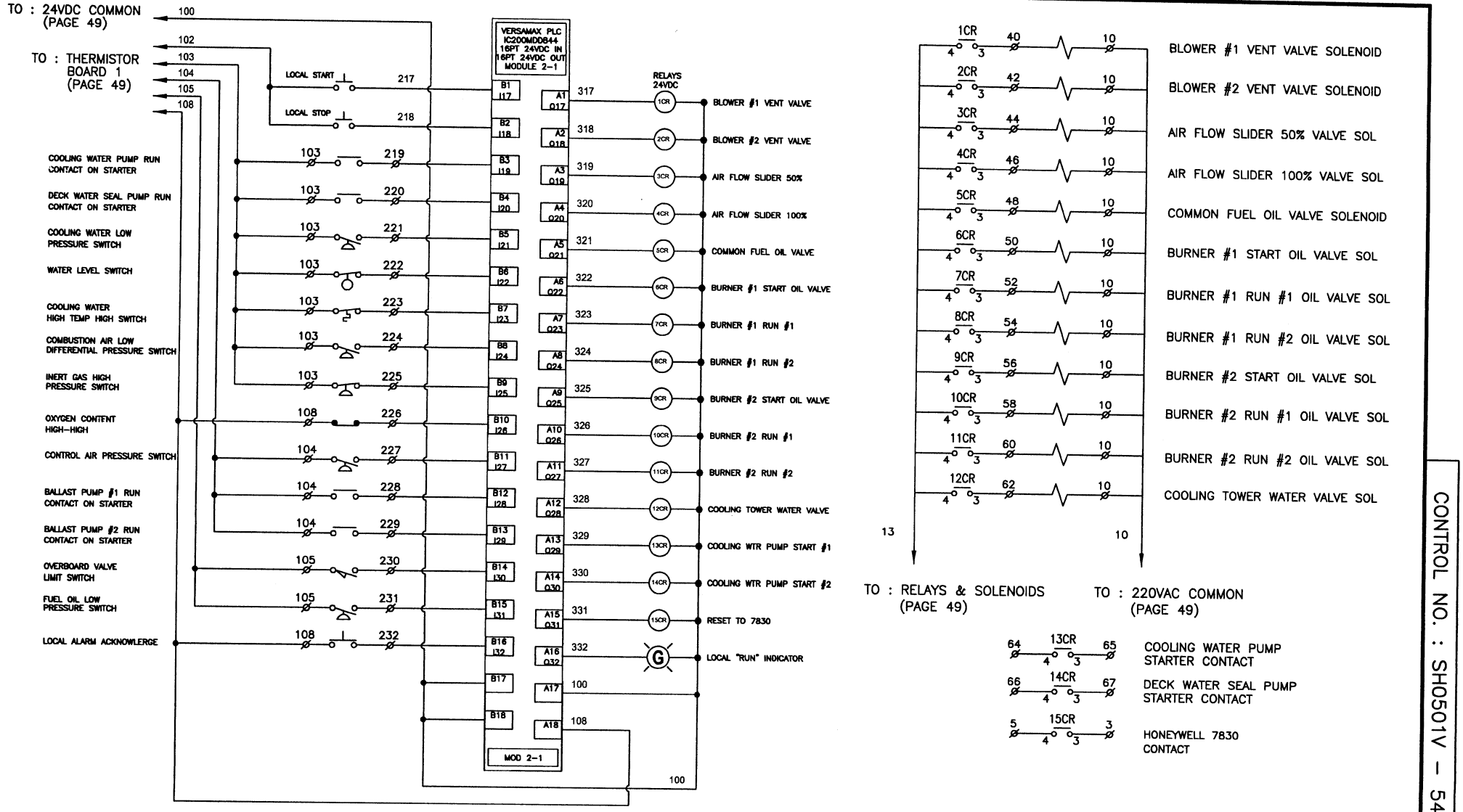


	DESCRIPTION :	DATE	BY	CHECKED	APPROVED
SAMGONG VOS	MAIN CONTROL PANEL PLC MODULE 1-3	10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho
		SCALE: NONE	DWG. NO.: SV6ED015		REV. △

CONTROL NO. : SH0501V – 53A / 119



	DESCRIPTION :	DATE	BY	CHECKED	APPROVED
SAMGONG VOS	MAIN CONTROL PANEL PLC MODULE 1-5	10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho
		SCALE: NONE	DWG. NO.: SV6ED015		REV.



SAMGONG VOS

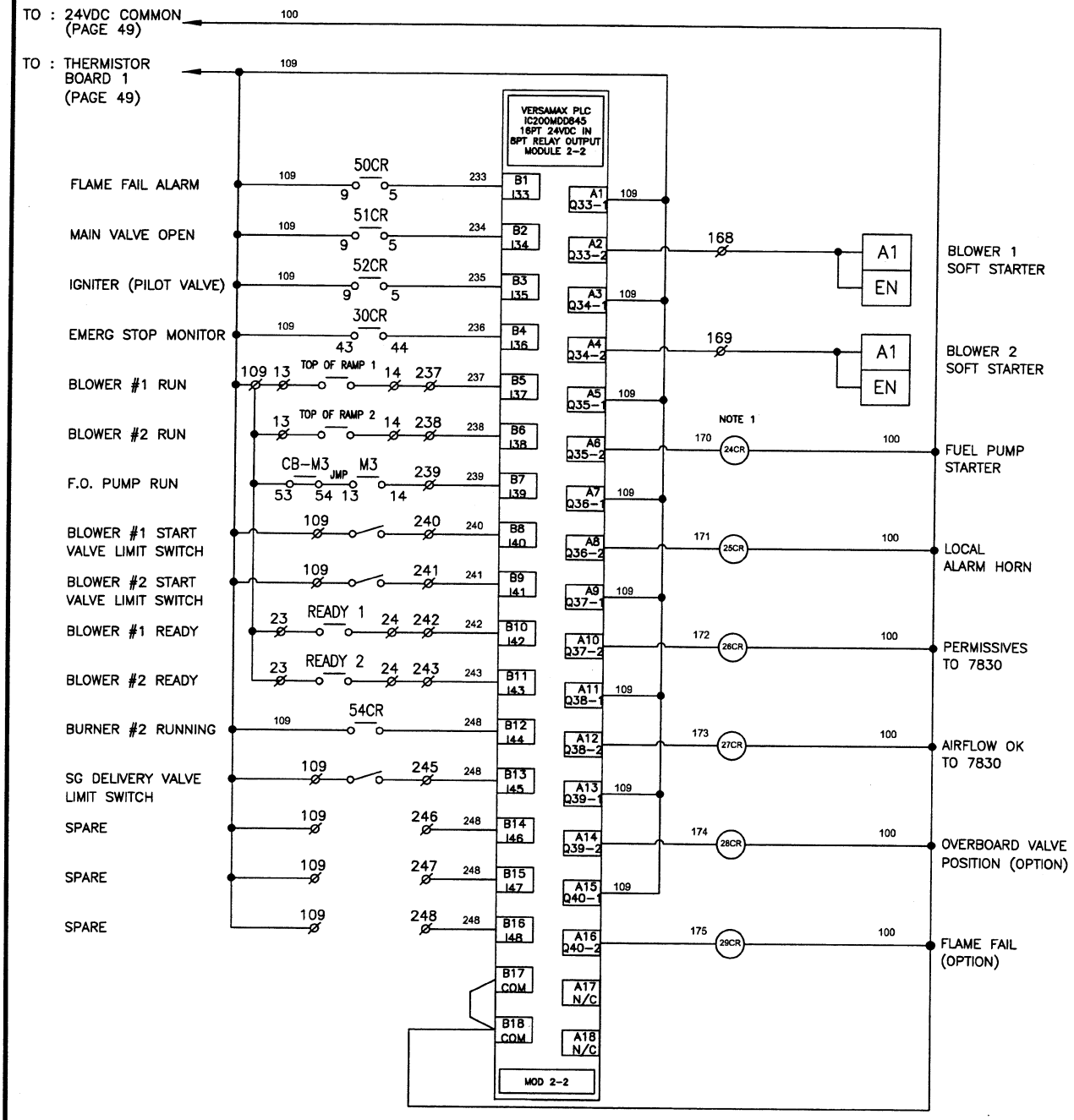
DESCRIPTION :

MAIN CONTROL PANEL
PLC MODULE 2-1

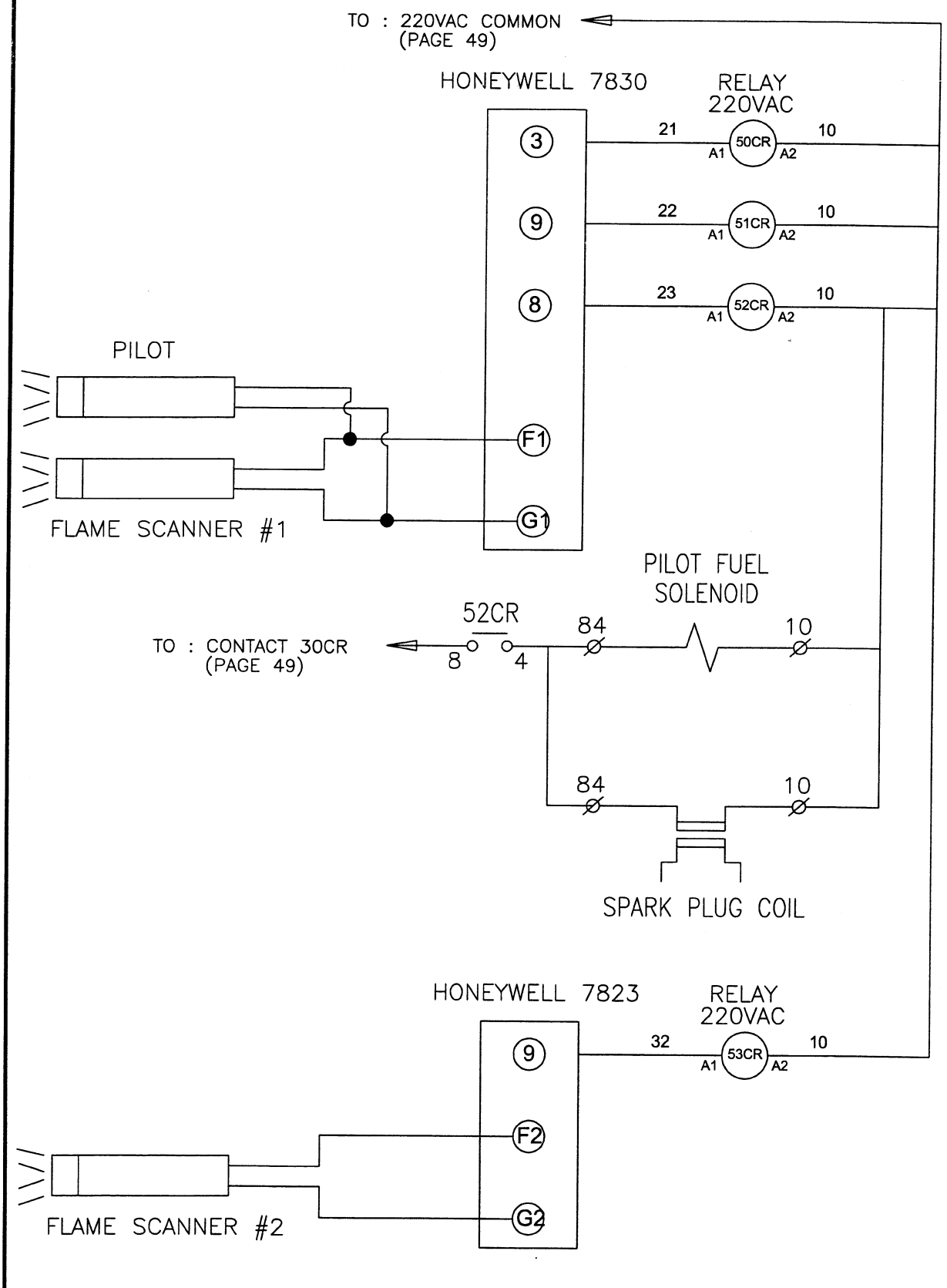
DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho

SCALE	DWG. NO.	REV.
NONE	SV6ED016	△

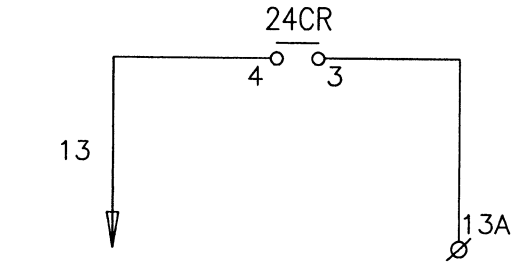
CONTROL NO. : SH0501V - 54 / 119



	DESCRIPTION :	DATE	BY	CHECKED	APPROVED
SAMGONG VOS	MAIN CONTROL PANEL PLC MODULE 2-2 (1/3)	10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho
		SCALE: NONE	DWG. NO.: SV6ED017		REV. △

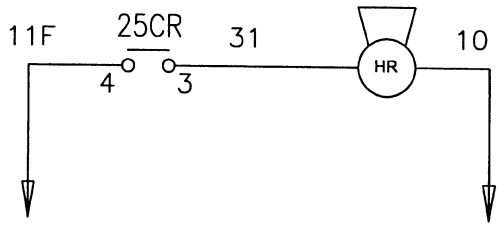


SAMGONG VOS	DESCRIPTION : MAIN CONTROL PANEL PLC MODULE 2-2 (2/3)	DATE 10.06.15	BY D.S.Kim	CHECKED U.S.Shon	APPROVED Y.M.Cho
		SCALE NONE	DWG. NO. SV6ED018		REV. △



TO : CONTACT 30CR
(PAGE 49)

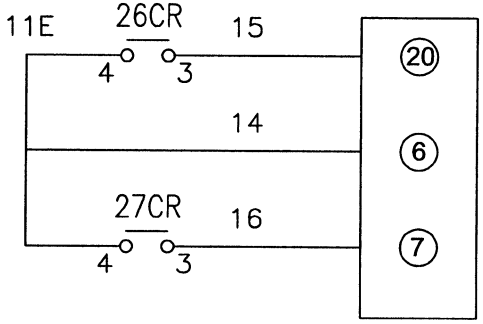
MAIN CONTROL PANEL
SG HORN

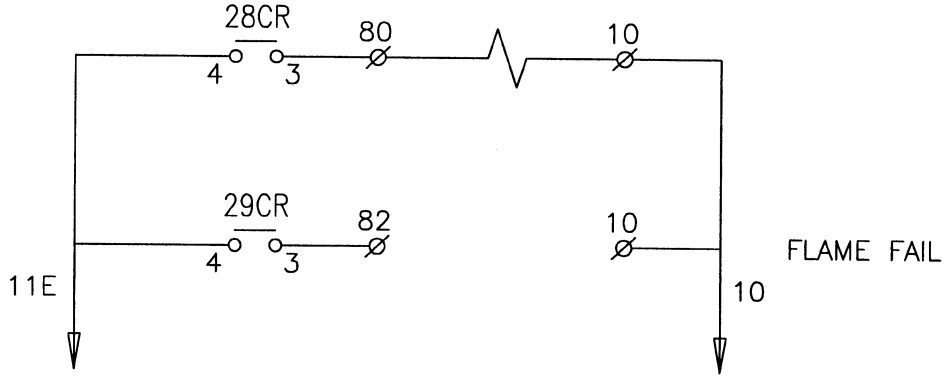


TO : SG HORN
(PAGE 49)

TO : 220VAC COMMON
(PAGE 49)

HONEYWELL 7830



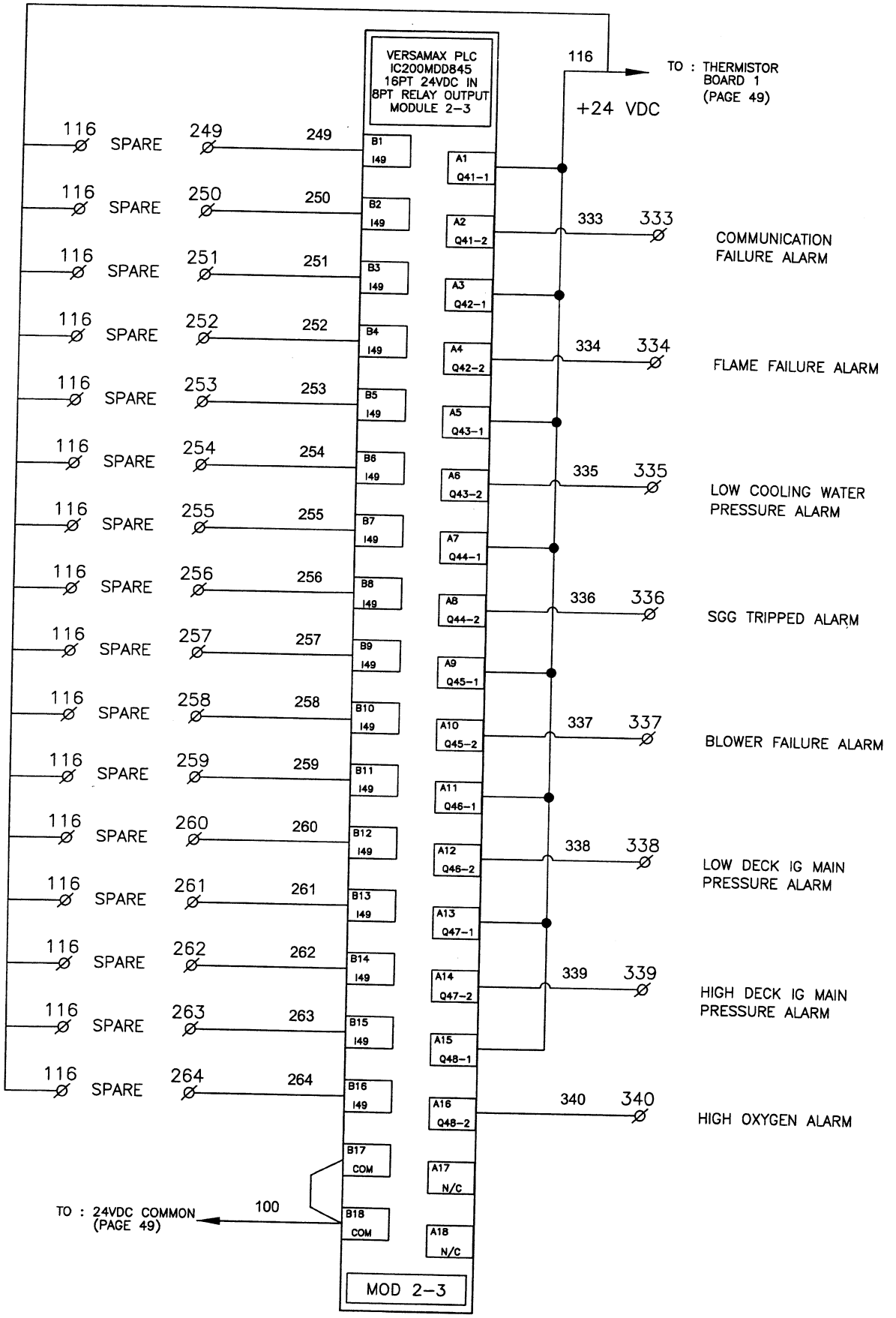


TO : RELAYS & SOLENOIDS
(PAGE 49)

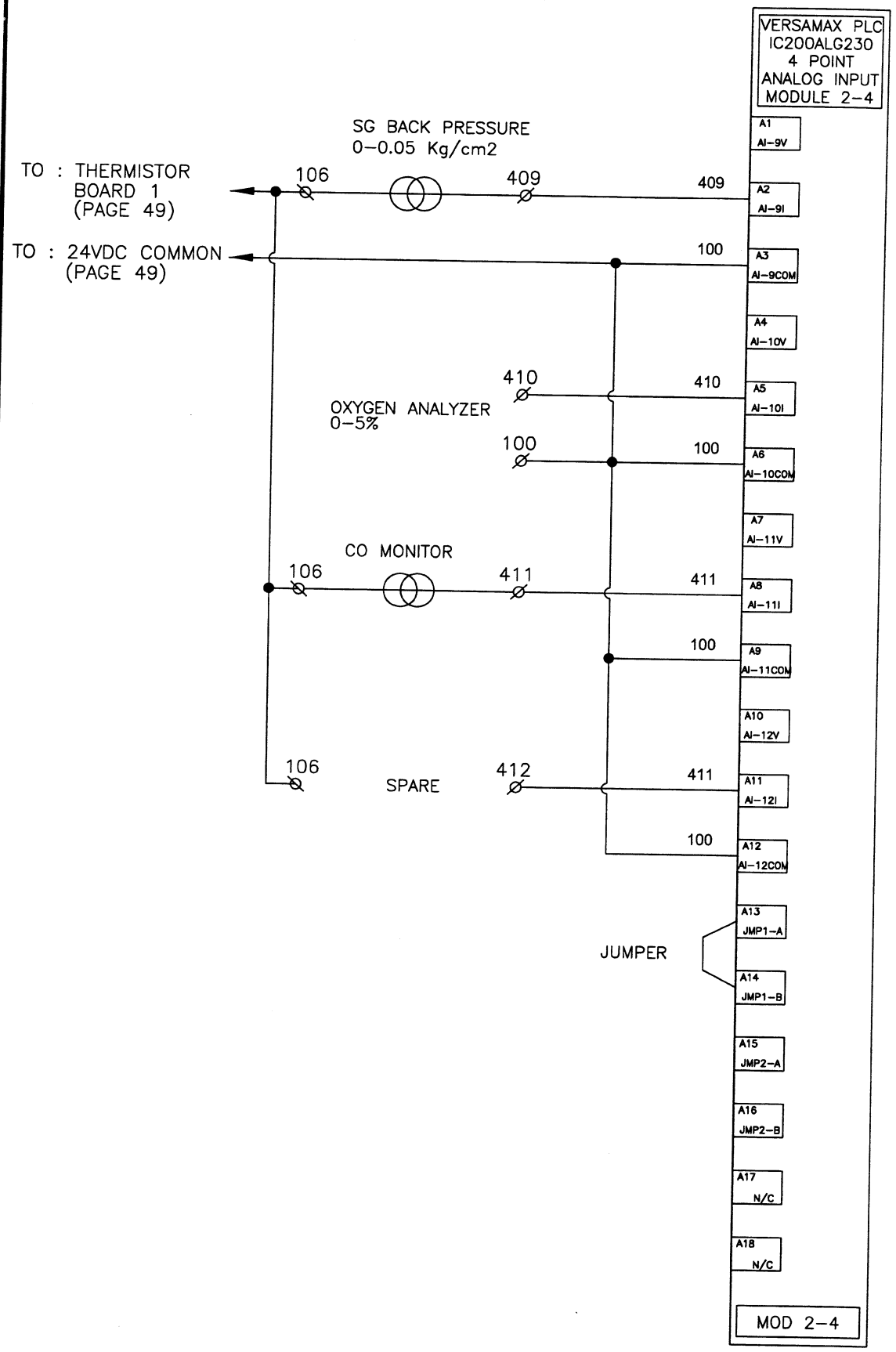
TO : 220VAC COMMON
(PAGE 49)

SAMGONG VOS	DESCRIPTION : MAIN CONTROL PANEL PLC MODULE 2-2 (3/3)	DATE 10.06.15	BY D.S.Kim	CHECKED V.S.Shon	APPROVED Y.M.Cho
		SCALE NONE	DWG. NO. SV6ED019		REV. △

CONTROL NO. : SH0501V – 57 / 119

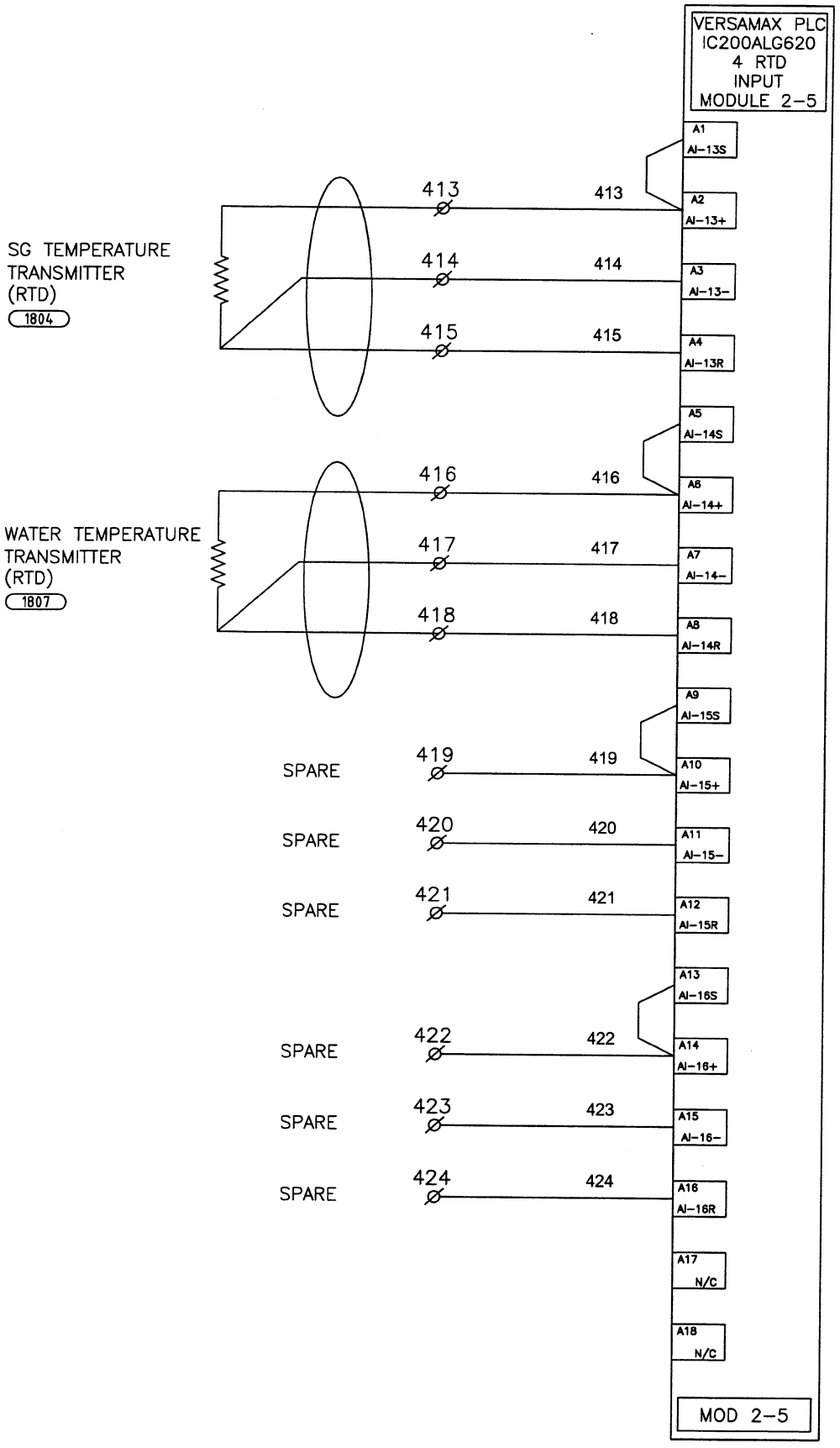


SAMGONG VOS	DESCRIPTION : MAIN CONTROL PANEL PLC MODULE 2-3	DATE 10.06.15	BY D.S.Kim	CHECKED V.S.Shon	APPROVED Y.M.Cho
		SCALE NONE	DWG. NO. SV6ED020		REV. △

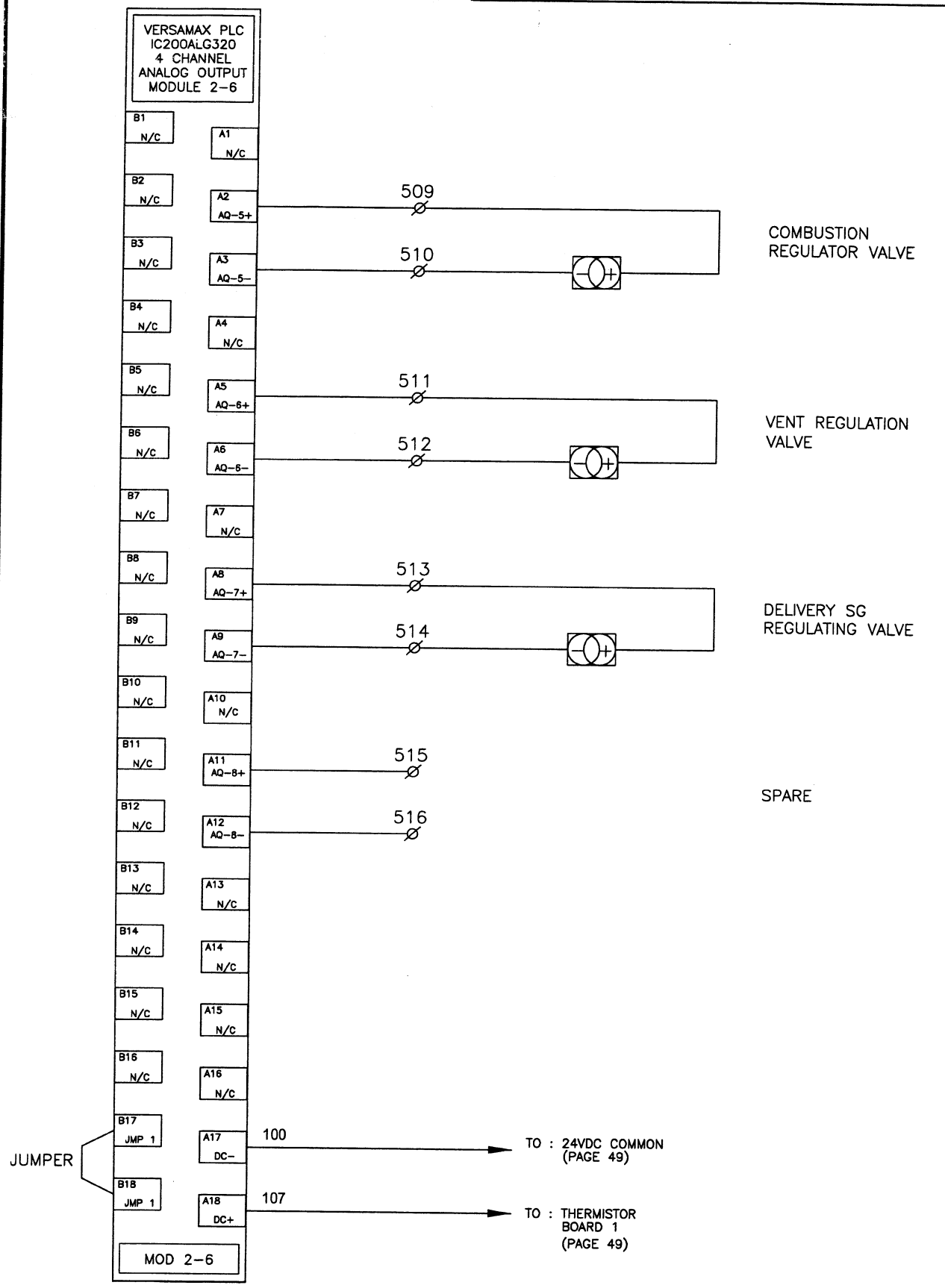


	DESCRIPTION :	DATE	BY	CHECKED	APPROVED
SAMGONG VOS	MAIN CONTROL PANEL PLC MODULE 2-4	10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho
		SCALE: NONE	DWG. NO.: SV6ED021		REV.

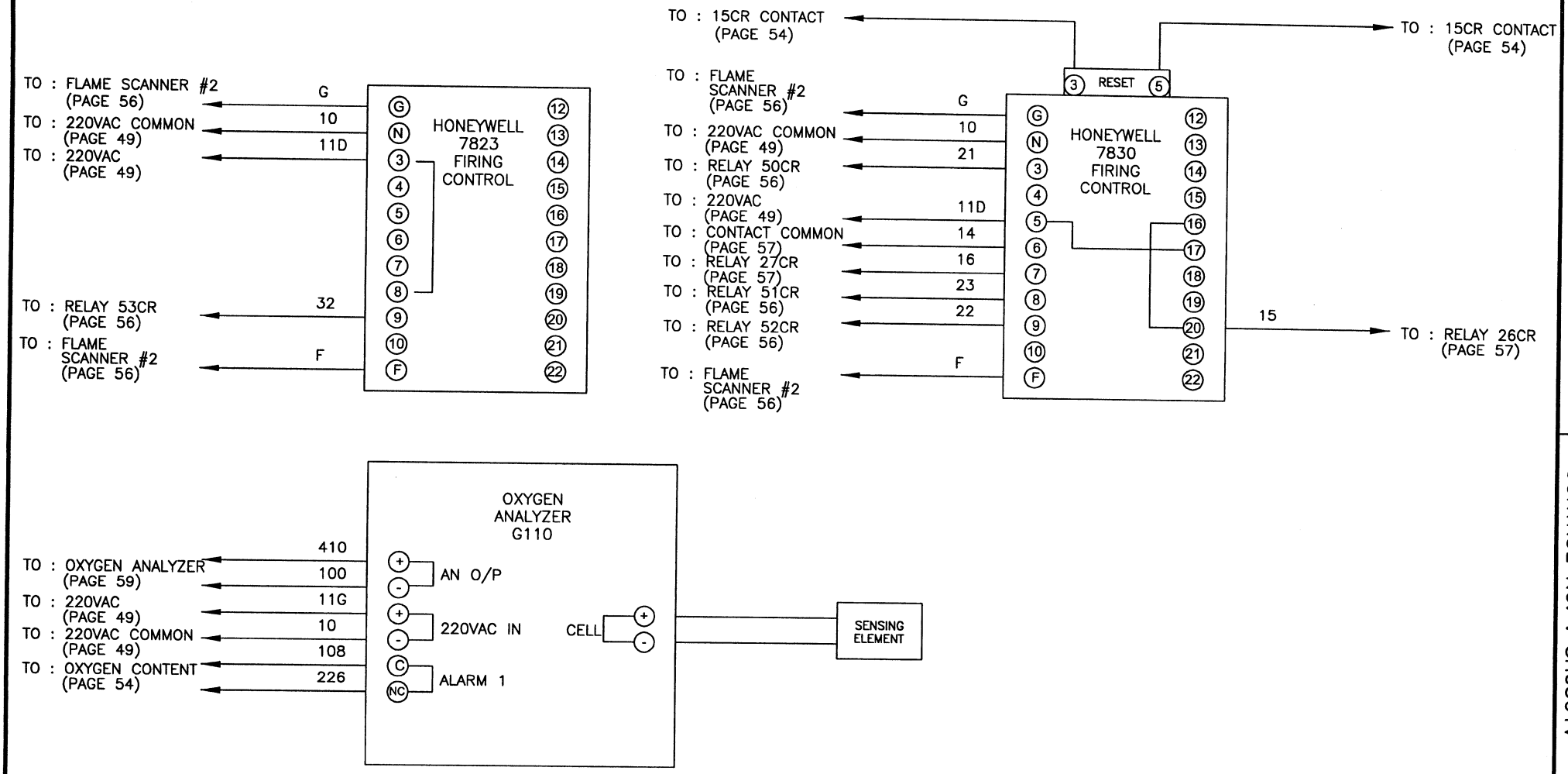
CONTROL NO. : SH0501V – 60 / 119



SAMGONG VOS	DESCRIPTION : MAIN CONTROL PANEL PLC MODULE 2-5	DATE 10.06.15	BY D.S.Kim	CHECKED U.S.Shon	APPROVED Y.M.Cho
		SCALE NONE	DWG. NO. SV6ED022		REV. △



SAMGONG VOS	DESCRIPTION : MAIN CONTROL PANEL PLC MODULE 2-6	DATE 10.06.15	BY D.S.Kim	CHECKED U.S.Shon	APPROVED Y.M.Cho
		SCALE NONE	DWG. NO. SV6ED023		REV. △



SAMGONG VOS

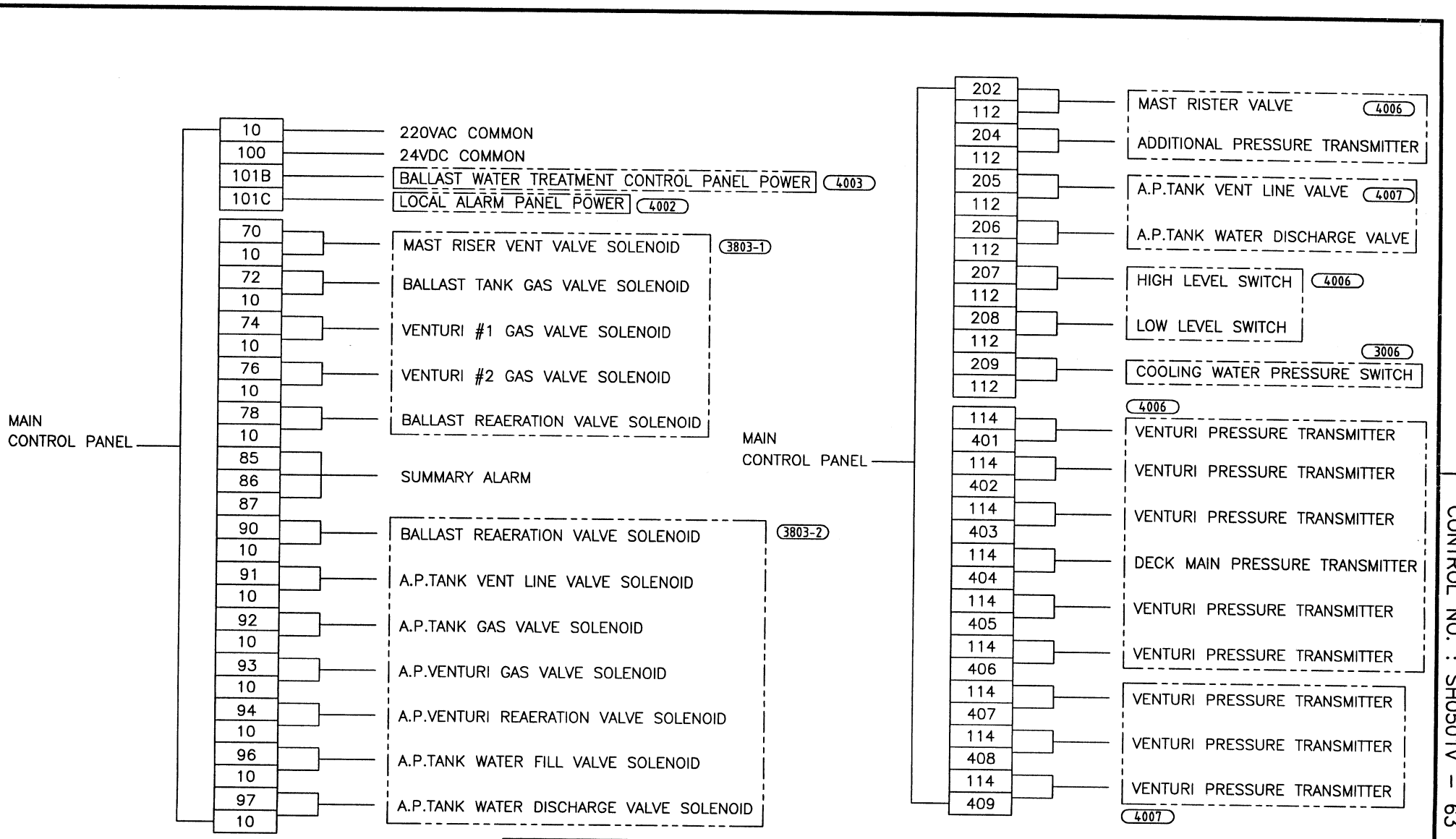
DESCRIPTION :

MAIN CONTROL PANEL
HONEYWELL

DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho

SCALE	DWG. NO.	REV.
NONE	SV6ED024	△

CONTROL NO. : SH0501V – 62 / 119



SAMGONG VOS

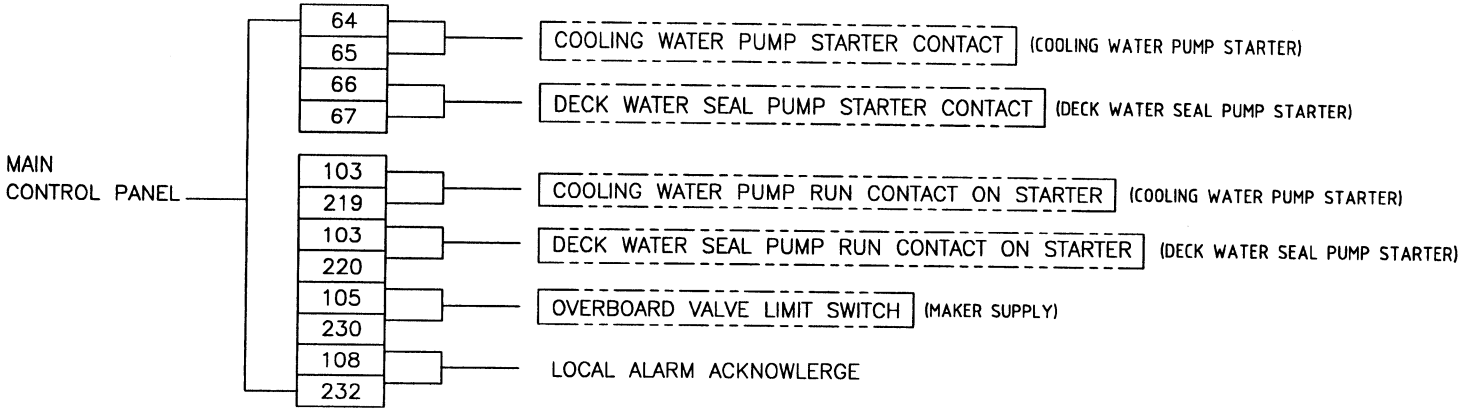
DESCRIPTION :

SHIP YARD CABLE CONNECTION
MAIN CONTROL PANEL
TERMINAL BLOCK (1/2)

DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho

SCALE	DWG. NO.	REV.
NONE	SV6ED025	△

CONTROL NO. : SH0501V – 63 / 119



SAMGONG VOS

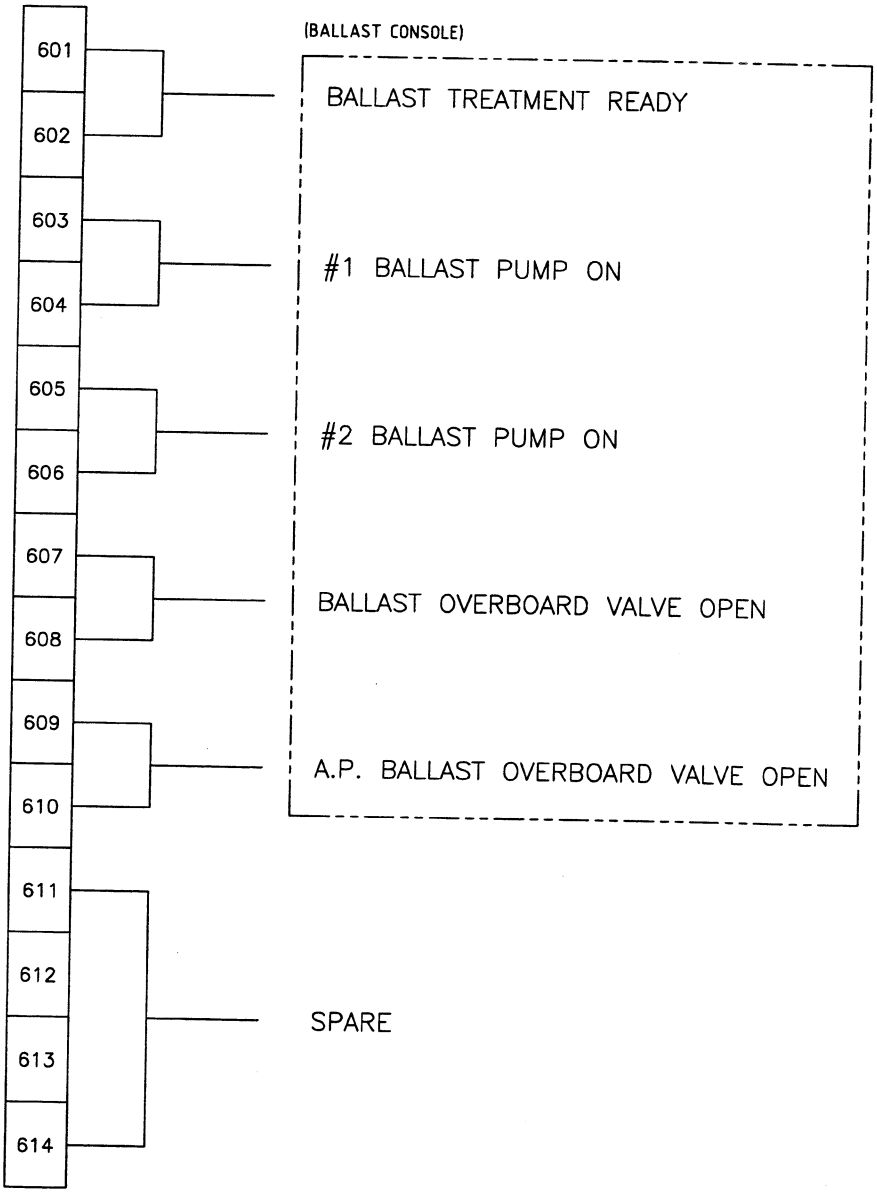
DESCRIPTION :

SHIPYARD CABLE CONNECTION
MAIN CONTROL PANEL
TERMINAL BLOCK (2/2)

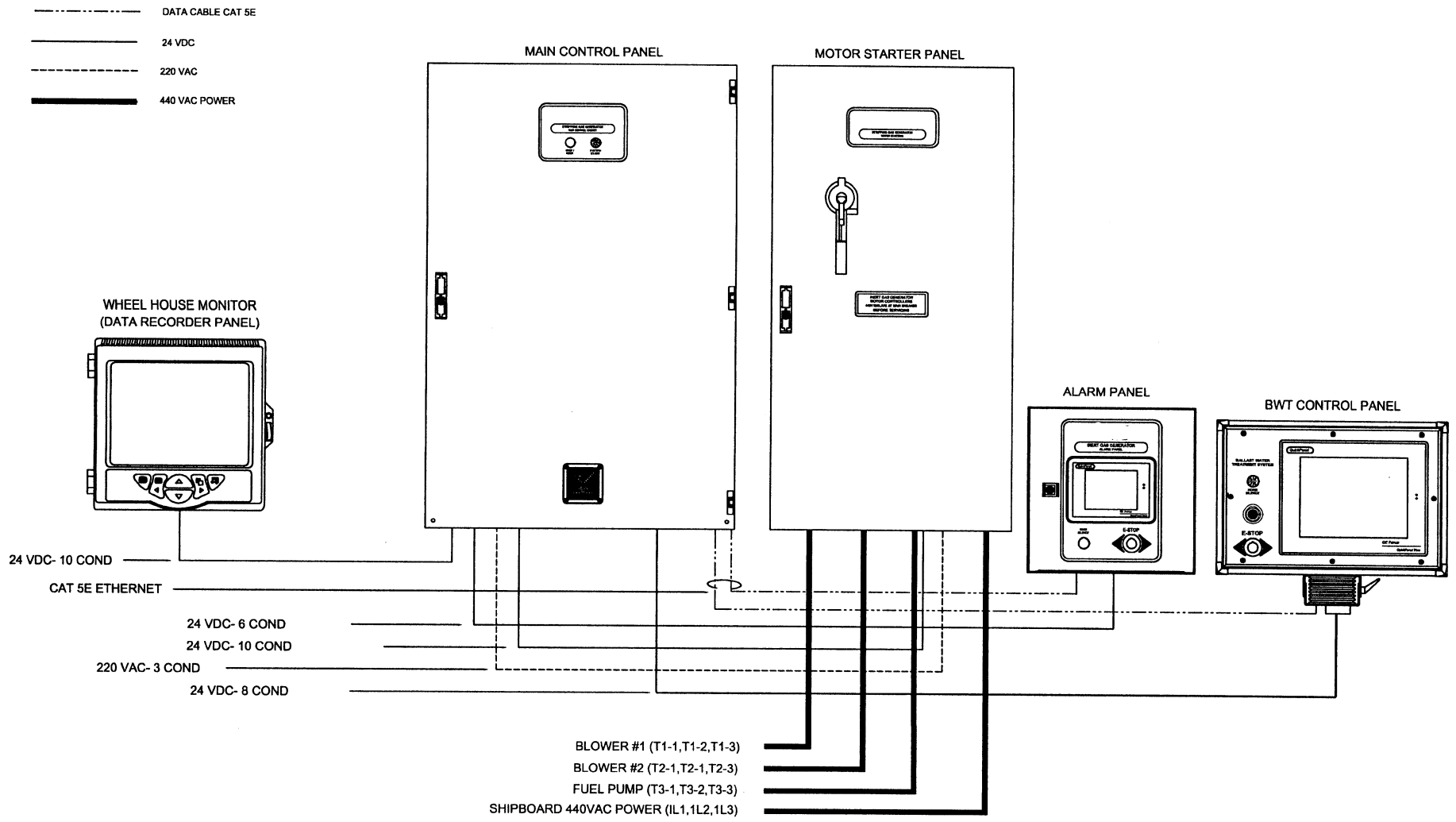
DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	V.S.Shon	Y.M.Cho

SCALE	DWG. NO.	REV.
NONE	SV6ED026	△

CONTROL NO. : SH0501V – 64 / 119



	DESCRIPTION :	DATE	BY	CHECKED	APPROVED
SAMGONG VOS	SHIPYARD CABLE CONNECTION BWT CONTROL PANEL TERMINAL BLOCK	10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho
		SCALE: NONE	DWG. NO.: SV6ED015		REV. △



SAMGONG VOS

DESCRIPTION :

CABLE INTERCONNECT

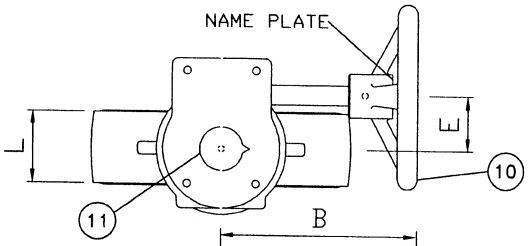
DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho

SCALE	DWG. NO.	REV.
NONE	SV6ED028	△

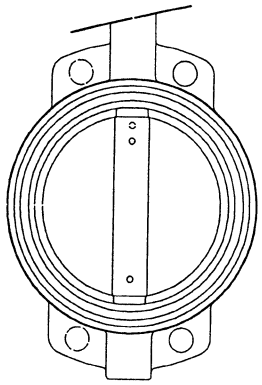
CONTROL NO. : HS0501V – 66 / 119

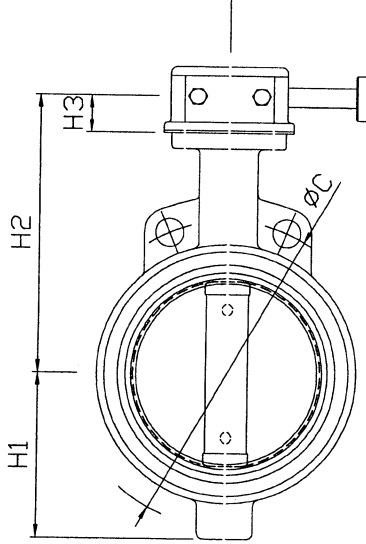
3. Parts Drawings

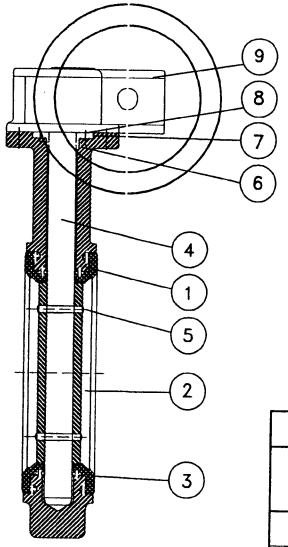
	DESCRIPTION :	DATE	BY	CHECKED	APPROVED
SAMGONG VOS	PARTS DRAWINGS COVER	10.06.25	D.S.Kim	U.S.Shon	Y.M.Cho
		SCALE NONE	DWG. NO. SV6PD001		REV △



ND 250(10") & OVER



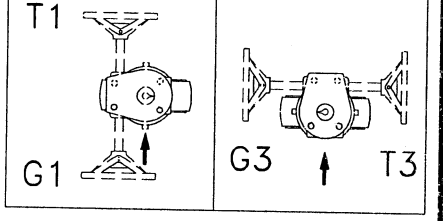




TAG NO.
1106

P.NO.	PART NAME	MATERIAL	Q'TY	REMARK
1	BODY	DUCTILE IRON	1	FCD450
2	DISC	ST.ST.	1	SCS14
3	SEAT	RUBBER	1	NBR
4	STEM	ST.ST.	1	SUS410
5	DISC PIN	ST.ST.	1set	SUS304
6	O-RING	RUBBER	2	NBR
7	GLAND BUSH	STEEL(G)	1	
8	GLAND BOLT	ST.ST.	1set	
9	GEAR BOX	ASS'Y	1	
10	HAND WHEEL	CAST IRON	1	
11	INDICATOR	STEEL	1	

GEAR TYPE



DIMENSIONS Unit : mm

NOMINAL DIAMETER	L	øC	REFERENCE						Weight Approx. (Kg)
			H1	H2	H3	B	E	øM	
50(2")	43	105	55	164	36	135	45	145	7.2
65(2½")	46	130	66	176	36	135	45	145	8.2
80(3")	46	145	75	186	36	135	45	145	8.7
100(4")	52	165	95	201	36	135	45	145	9.2
125(5")	56	200	110	214	36	135	45	145	10.7
150(6")	56	230	130	226	36	135	45	145	12.2
200(8")	60	280	155	269	39	205	65	195	16.7
250(10")	68	345	215	309	39	205	65	195	23.7
300(12")	78	390	251	349	39	205	65	195	34.7
350(14")	78	435	277	374	39	205	65	195	47.2

NOTES

1. HYDROSTATIC TEST

Check	Description		HYD. TEST PRESS	Working pressure
□	BODY		Working pressure × 1.5time	
	SEAT		Working pressure × 1.1time	
■	JIS 5K	BODY	7.5 Kg/cm²	
		SEAT	5.5 Kg/cm²	

2. BODY MARKING

ACE
5K
SIZE
MATERIAL

3. FLANGE FINISH : ■ N/A
4. GEAR TYPE : T3

SAMGONG VOS

DESCRIPTION :

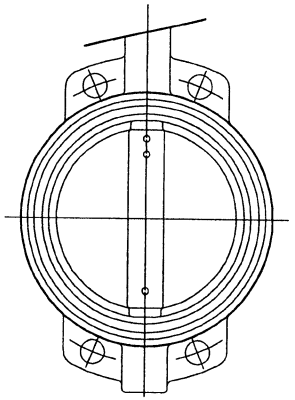
WATER SHUT-OFF TO SGG VALVE
(MANUAL BUTTERFLY VALVE)

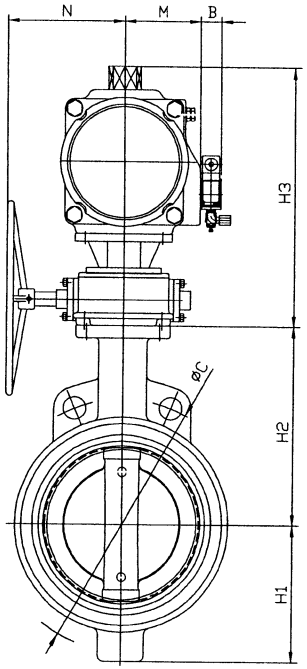
DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	V.S.Shon	Y.M.Cho

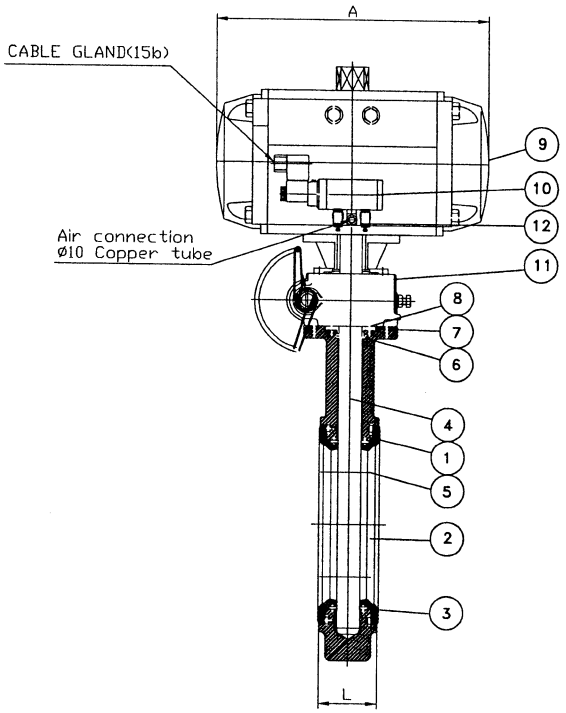
SCALE	DWG. NO.	REV.
NONE	SV6PD001	△

CONTROL NO. : SH0501V - 68 / 119

ND 250(10") & OVER



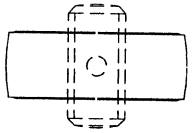




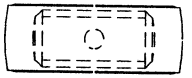
P.NO.	PART NAME	MATERIAL	Q'TY	REMARK
1	BODY	DUCTILE IRON	1	FCD450
2	DISC	ST.ST.	1	SCS14
3	SEAT	RUBBER	1	NBR
4	STEM	ST.ST.	1	SUS410
5	DISC PIN	ST.ST.	1set	SUS304
6	O-RING	RUBBER	2	NBR
7	GLAND BUSH	STEEL(G)	1	
8	GLAND BOLT	ST.ST.	1set	
9	ACTUATOR	ASS'Y	1	
10	SOLENOID VALVE	ASS'Y	1	
11	DECLUTCH GEAR	ASS'Y	1	
12	SILENCER	ASS'Y	2	

ACTUATOR POSITION

P1



P3



TAG NO.
1107

NOTES

1. HYDROSTATIC TEST

Check	Description		HYD. TEST PRESS	Working pressure
□	BODY		Working pressure × 1.5time	
	SEAT		Working pressure × 1.1time	
■	JIS 5K	BODY	7.5 Kg/cm²	
		SEAT	5.5 Kg/cm²	

2. BODY MARKING

ACE
5K
SIZE
MATERIAL

3. FLANGE FINISH : ■ N/A
4. ACTUATOR POSITION : P1
5. IN CASE OF ACTUATOR DIMENSION,
   SEE FINAL PAGES FOR EACH ACTUATOR MODEL.

DIMENSIONS — Unit : mm

NOMINAL DIAMETER	L	øC	REFERENCE (APPROX.)								Weight Approx. (Kg)
			H1	H2	H3	A	B	M	N	ACT MODEL	
300(12")	78	390	251	310	344	347	32	82	200	HP-125DA	50.5

SAMGONG VOS

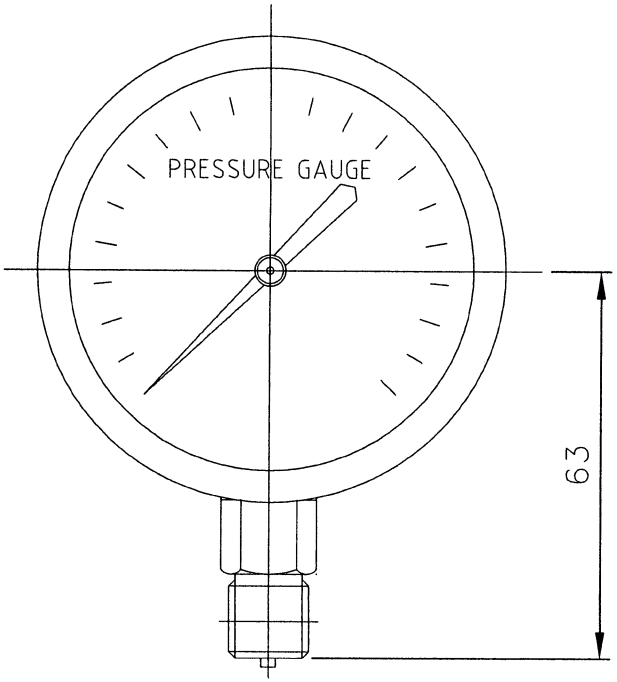
DESCRIPTION :

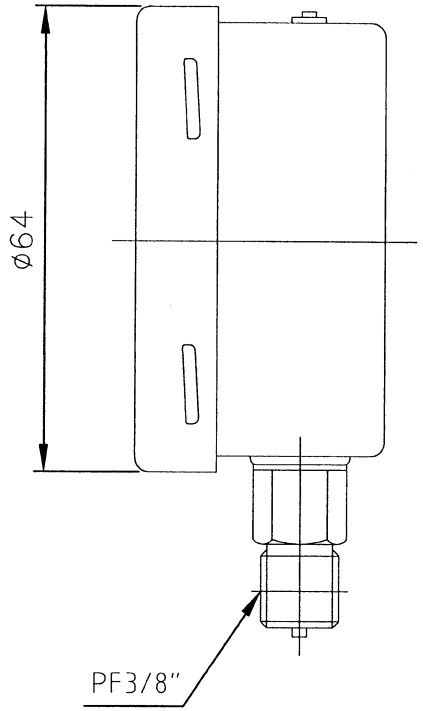
WATER SHUT-OFF TO COOLING TOWER VALVE

DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	V.S.Shon	Y.M.Cho

SCALE	DWG. NO.	REV.
NONE	SV6PD002	△

CONTROL NO. : SH0501V - 69 / 119





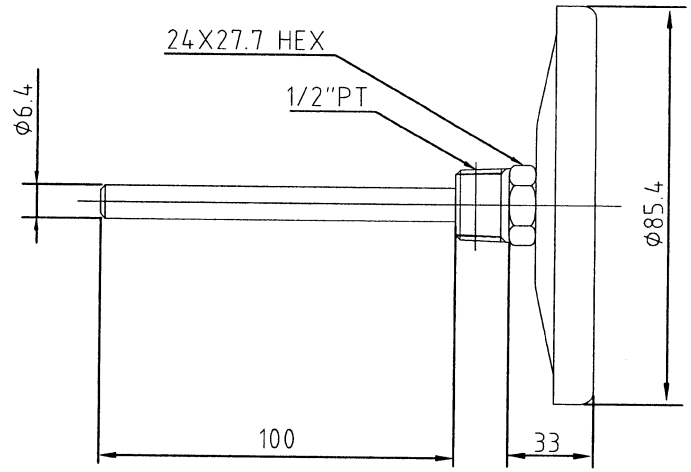
GENERAL SPECIFICATION

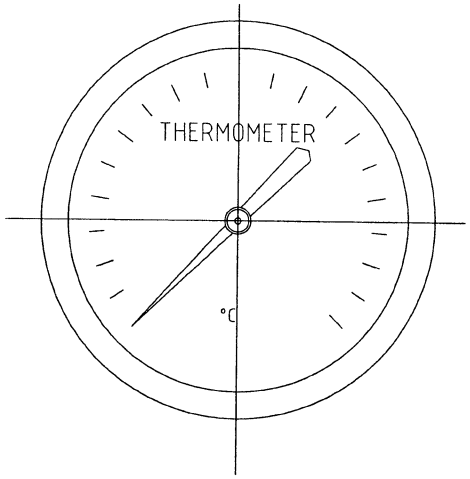
1. INDUSTRIAL PRESSURE GAUGE
2. ELEMENT : BOURDON TUBE
3. ACCURACY : ±1.5 OF FULL SCALE
4. MATERIAL : ELEMENT, SHANK / SUS316
   CASE, COVER, MOVEMENT / SUS304
5. LIQUID FILLED TYPE
6. RANGE : 0 ~ 4 Kg/cm^2

TAG NO.
1108

CONTROL NO. : SH0501V – 70 / 119

	DESCRIPTION :	DATE	BY	CHECKED	APPROVED
SAMGONG VOS	WATER PRESSURE GAUGE	10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho
		SCALE: NONE	DWG. NO.: SVPD003		REV. △

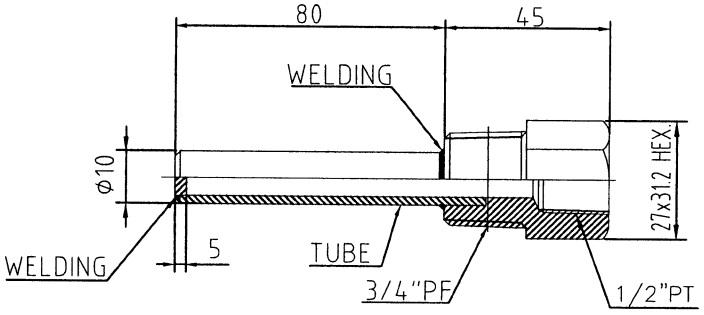




GENERAL SPECIFICATION

1. INDUSTRIAL BIMETAL THERMOMETER
2. RANGE(°C) : 0 ~ 100
3. ELEMENT : BIMETAL
4. ACCURACY : ± 2.0% OF FULL SCALE
5. DIAL SIZE : ø75
6. MATERIAL : CASE, COVER / SUS304
   STEM, CONNECTION / SUS304
   THERMOWELL / SUS316

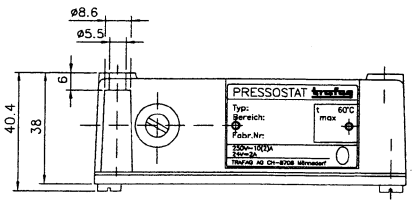
TAG NO.
1109

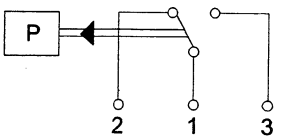


CONTROL NO. : SH0501V - 71 / 119

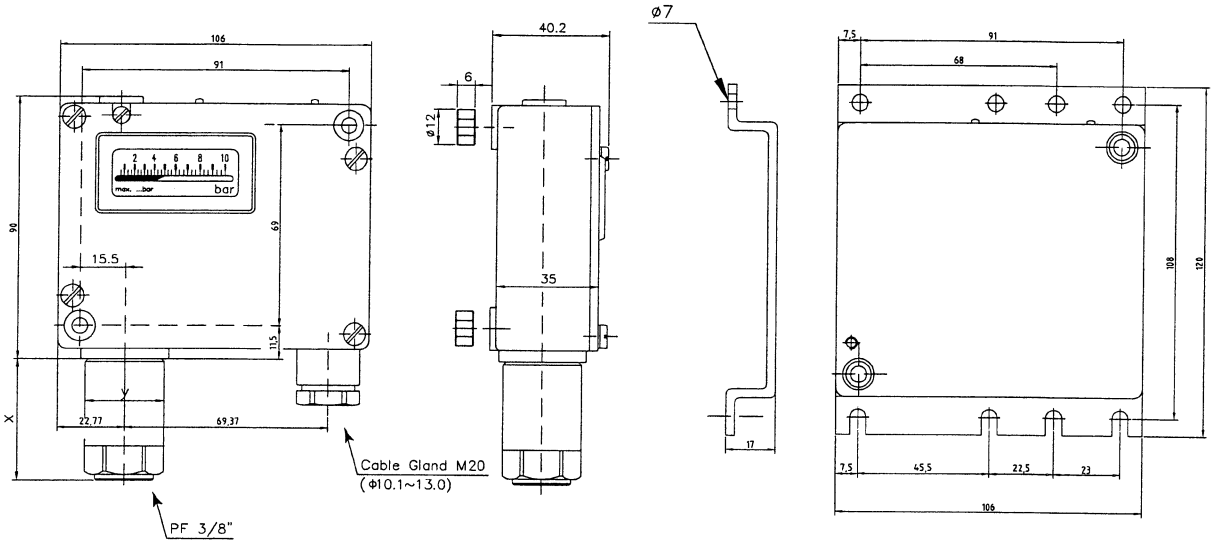
	DESCRIPTION :	DATE	BY	CHECKED	APPROVED
SAMGONG VOS	TEMPERATURE GAUGE	10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho
		SCALE: NONE	DWG. NO.: SVPD004		REV.

TAG NO.
1110





Connections



Mounting bracket No.31

· (Single stage Controller)

. Robust aluminium die cast housing, epoxy coated
. Accuracy ±2% of full scale
. Rapeatability < ±0.5% of full scale
. Protection IP65
. Any mounting position possible
. Electrical connection to thress point terminal inside housing

(Microswitch ratings)

. Switch type No.11, 23 and 26
- AC 380V ~ 15 (3) A
- DC 220V - 0.2 (0.02) A 110V - 0.4 (0.03) A
24V - 6 (2) A 12V - 15 (8) A

. Switch type No.10
- AC 250V ~ 10 (2) A
- DC 220V - 0.2 (0.01) A 110V - 0.4 (0.02) A
24V - 2.0 (1.0) A 12V - 15 (7) A

(Specifications)

Pressure range in bar	max. working Pressure in bar	max. short time over pressure in bar	Switch type number	Switching differential in bar	Ambient temperature	Media temperature
-0.9 ... 1.5 0.2 ... 1.6 0.2 ... 2.5	10	13	10 12, 23	ca. 0.03 ca. 0.06	-20 ... +70°C	-40 ... +150°C
0 ... 4 0 ... 6	12	26	10 12, 23	ca. 0.08 ca. 0.2		
1 ... 10 1 ... 16	24	36	10 12, 23	ca. 0.2 ca. 0.4		
2 ... 25 4 ... 40	40	75	10 12, 23	ca. 0.5 ca. 1.0		

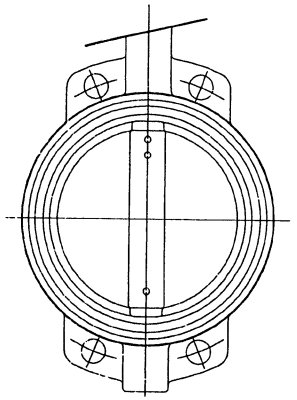
SAMGONG VOS

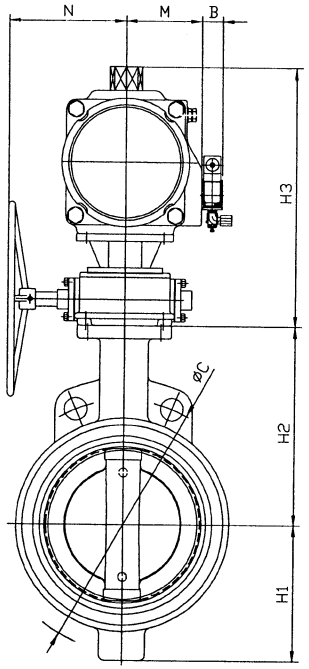
DESCRIPTION :
PRESSURE SWITCH
(type : 900)

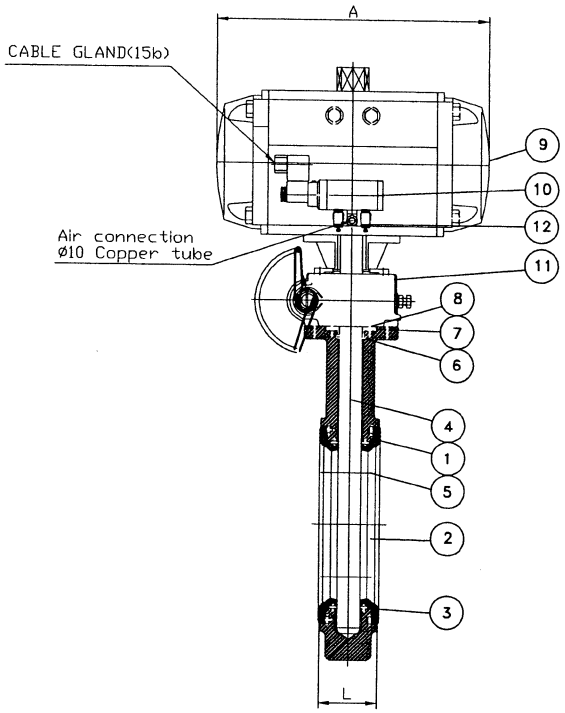
DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho

SCALE	DWG. NO.	REV.
NONE	SV6TD005	△

ND 250(10") & OVER



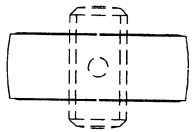




P.NO.	PART NAME	MATERIAL	Q'TY	REMARK
1	BODY	DUCTILE IRON	1	FCD450
2	DISC	ST.ST.	1	SCS14
3	SEAT	RUBBER	1	NBR
4	STEM	ST.ST.	1	SUS410
5	DISC PIN	ST.ST.	1set	SUS304
6	O-RING	RUBBER	2	NBR
7	GLAND BUSH	STEEL(G)	1	
8	GLAND BOLT	ST.ST.	1set	
9	ACTUATOR	ASS'Y	1	
10	SOLENOID VALVE	ASS'Y	1	
11	DECLUTCH GEAR	ASS'Y	1	
12	SILENCER	ASS'Y	2	

ACTUATOR POSITION

P1



P3

TAG NO.

1111

NOTES

1. HYDROSTATIC TEST

Check	Description		HYD. TEST PRESS	Working pressure
□	BODY		Working pressure x 1.5time	
	SEAT		Working pressure x 1.1time	
■	JIS 5K	BODY	7.5 Kg/cm²	
		SEAT	5.5 Kg/cm²	

2. BODY MARKING

ACE
5K
SIZE
MATERIAL

3. FLANGE FINISH : ■ N/A
4. ACTUATOR POSITION : P1
5. IN CASE OF ACTUATOR DIMENSION, SEE FINAL PAGES FOR EACH ACTUATOR MODEL.

DIMENSIONS Unit : mm

NOMINAL DIAMETER	L	øC	REFERENCE (APPROX.)								Weight Approx. (Kg)
			H1	H2	H3	A	B	M	N	ACT MODEL	
350(14")	78	435	270	335	391	467	32	101	200	HP-160DA	76.0

SAMGONG VOS

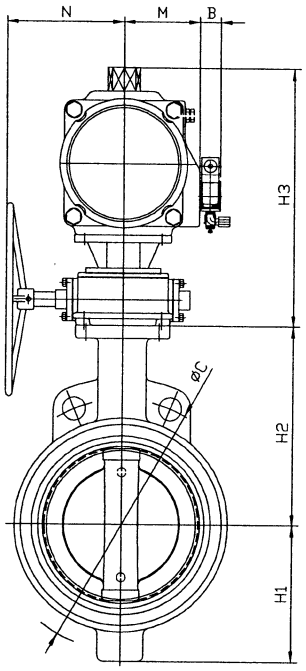
DESCRIPTION :

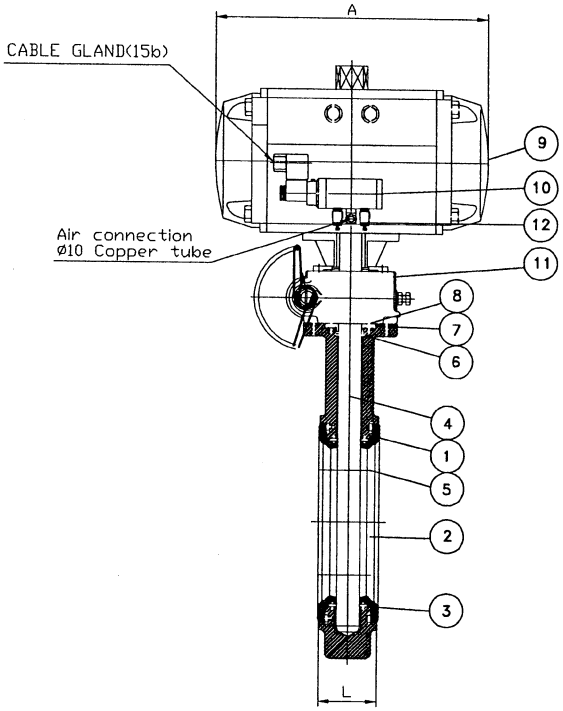
DIVERTER-TO-OVERBOARD VALVE

DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho

SCALE	DWG. NO.	REV.
NONE	SV6PD006	△

CONTROL NO. : SH0501V - 73 / 119

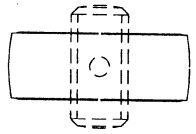




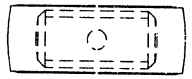
P.NO.	PART NAME	MATERIAL	Q'TY	REMARK
1	BODY	DUCTILE IRON	1	FCD450
2	DISC	ST.ST.	1	SCS14
3	SEAT	RUBBER	1	NBR
4	STEM	ST.ST.	1	SUS410
5	DISC PIN	ST.ST.	1set	SUS304
6	O-RING	RUBBER	2	NBR
7	GLAND BUSH	STEEL(G)	1	
8	GLAND BOLT	ST.ST.	1set	
9	ACTUATOR	ASS'Y	1	
10	SOLENOID VALVE	ASS'Y	1	
11	DECLUTCH GEAR	ASS'Y	1	
12	SILENCER	ASS'Y	2	

ACTUATOR POSITION

P1



P3



TAG NO.

1112

NOTES

1. HYDROSTATIC TEST

Check	Description		HYD. TEST PRESS	Working pressure
□	BODY		Working pressure x 1.5time	
	SEAT		Working pressure x 1.1time	
■	JIS 5K	BODY	7.5 Kg/cm²	
		SEAT	5.5 Kg/cm²	

2. BODY MARKING

ACE
5K
SIZE
MATERIAL

3. FLANGE FINISH : ■ N/A
4. ACTUATOR POSITION : P1
5. IN CASE OF ACTUATOR DIMENSION,
   SEE FINAL PAGES FOR EACH ACTUATOR MODEL.

DIMENSIONS Unit : mm

NOMINAL DIAMETER	L	øC	REFERENCE (APPROX.)								Weight Approx. (Kg)
			H1	H2	H3	A	B	M	N	ACT MODEL	
80(3")	46	145	75	150	258	144	70	42	200	HP-50DA/HP63S-10S	12.9

SAMGONG VOS

DESCRIPTION :

DRAIN-TO-BILGE VALVE

DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho

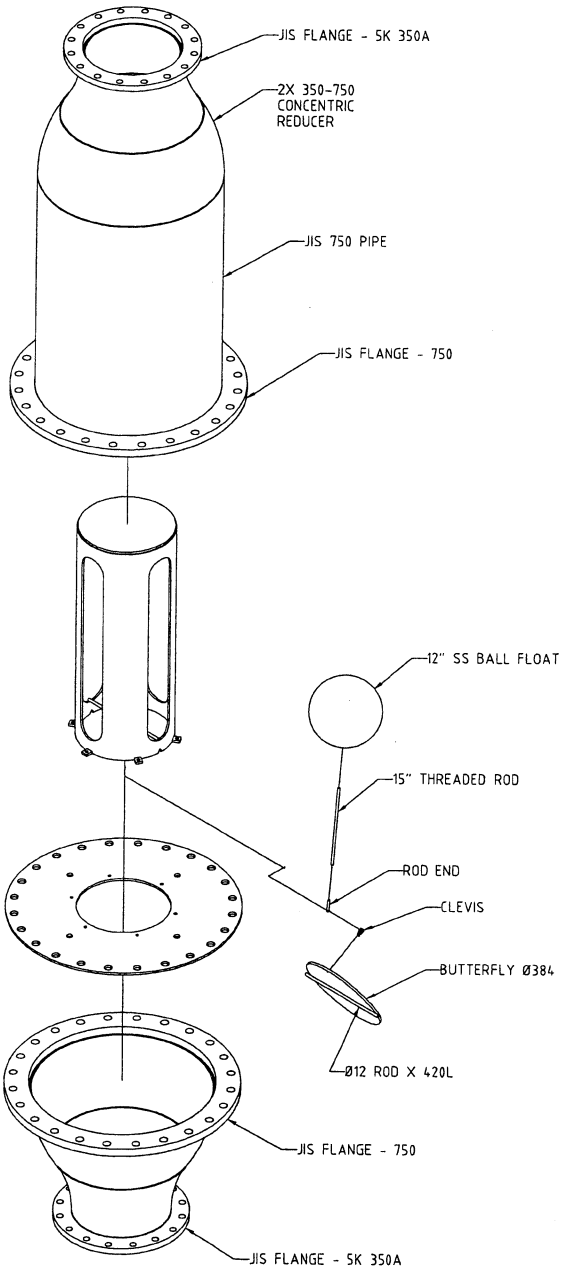
SCALE	DWG. NO.	REV.
NONE	SV6PD007	△

CONTROL NO. : SH0501V - 74 / 119

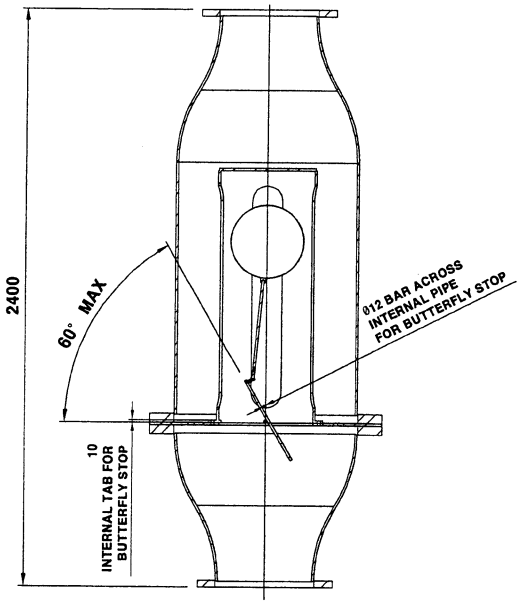
CONTROL NO. : SH0501V – 75 / 119

TAG NO.
1116

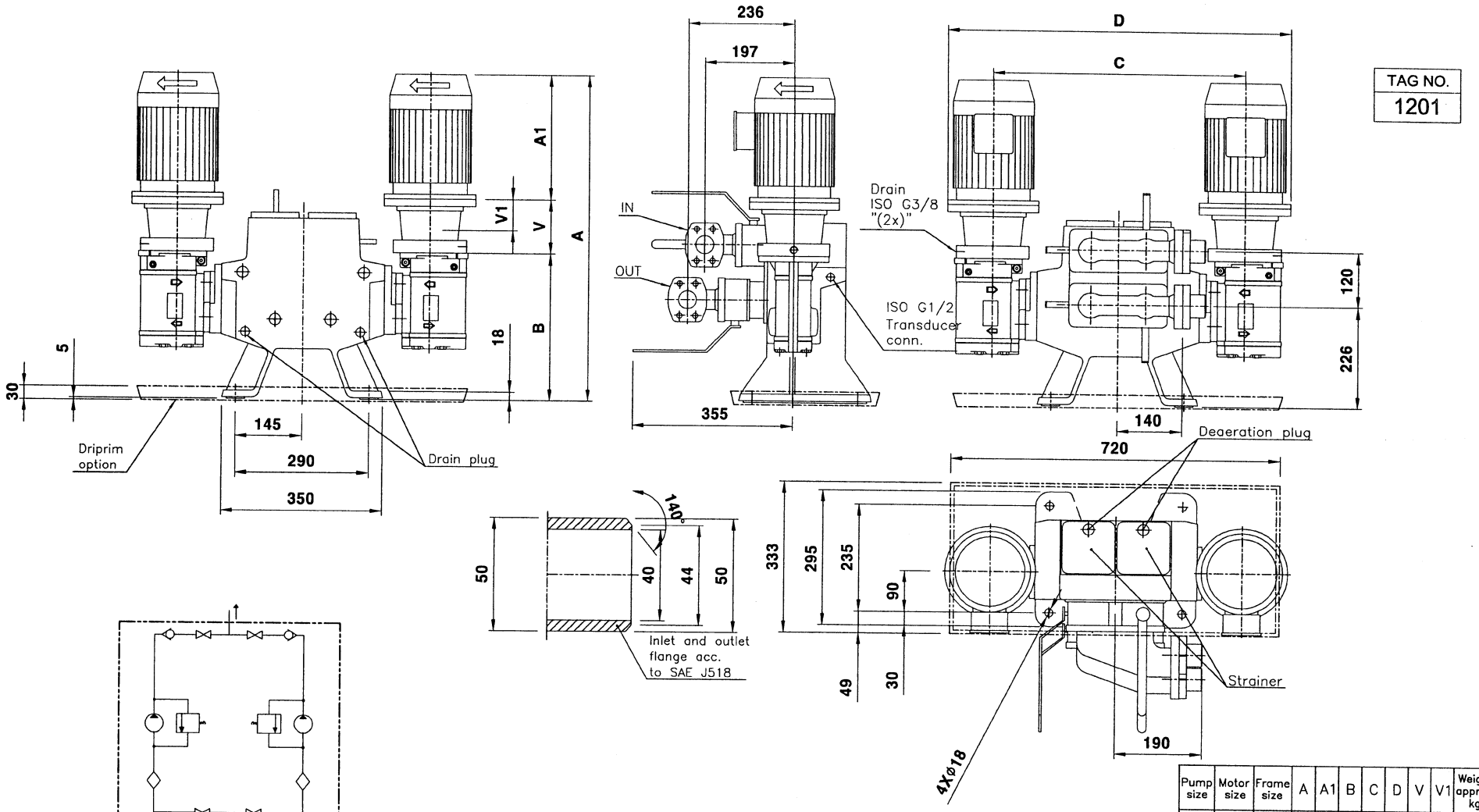
ISO VIEW



SECTION VIEW



	DESCRIPTION :	DATE	BY	CHECKED	APPROVED
SAMGONG VOS	FLOAT VALVE ASSEMBLY	10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho
		SCALE: NONE	DWG. NO.: SV6TD008		REV. △



Internal Diagram

TAG NO.
1201

Pump size	Motor size	Frame size	A	A1	B	C	D	V	V1	Weight approx. kg
025	71	F130	615	208	309	561	721	98	48	130
	80	F165	655	238			761	108	58	140
	90		699	272				118	68	150
	100	F125	745	308			811	128	78	165
	112		758	321						170

SAMGONG VOS

DESCRIPTION :

FUEL PUMP UNIT

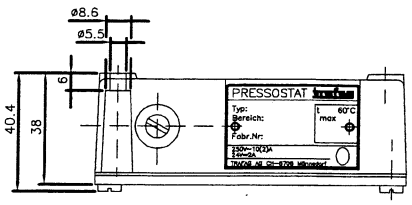
DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho

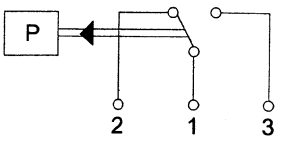
SCALE	DWG. NO.	REV.
NONE	SV6TD009	△

CONTROL NO. : SH0501V – 76 / 119

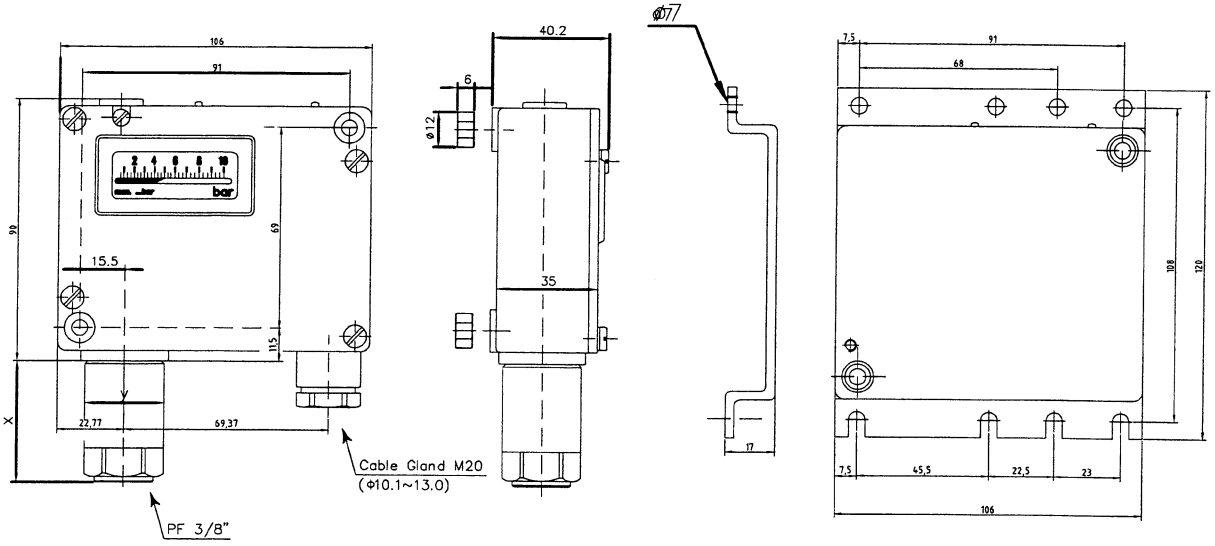
CONTROL NO. : SH0501V – 77 / 119

TAG NO.
1204





Connections



Mounting bracket No.31

(Single stage Controller)

. Robust aluminium die cast housing, epoxy coated
. Accuracy ±2% of full scale
. Rapeatability < ±0.5% of full scale
. Protection IP65
. Any mounting position possible
. Electrical connection to thress point terminal inside housing

(Microswitch ratings)

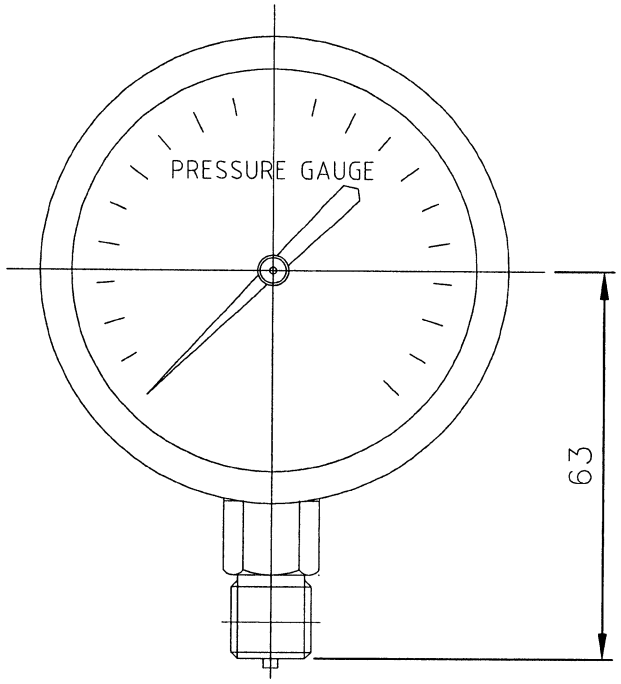
. Switch type No.11, 23 and 26
- AC 380V ~ 15 (3) A
- DC 220V - 0.2 (0.02) A 110V - 0.4 (0.03) A
24V - 6 (2) A 12V - 15 (8) A

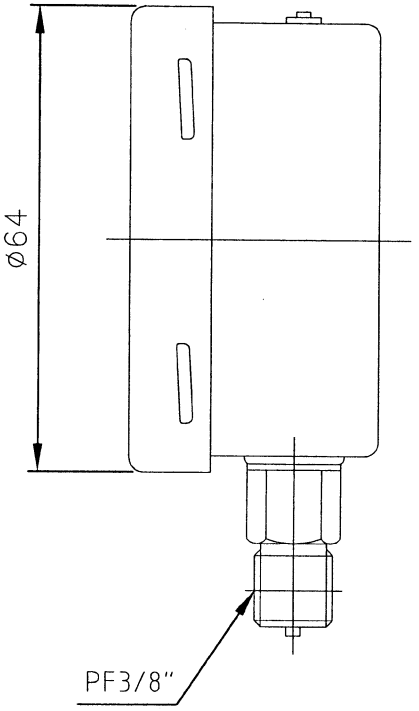
. Switch type No.10
- AC 250V ~ 10 (2) A
- DC 220V - 0.2 (0.01) A 110V - 0.4 (0.02) A
24V - 2.0 (1.0) A 12V - 15 (7) A

(Specifications)

Pressure range in bar	max. working Pressure in bar	max. short time over pressure in bar	Switch type number	Switching differential in bar	Ambient temperature	Media temperature
-0.9 ... 1.5 0.2 ... 1.6 0.2 ... 2.5	10	13	10 12, 23	ca. 0.03 ca. 0.06	-20 ... +70°C	-40 ... +150°C
0 ... 4 0 ... 6	12	26	10 12, 23	ca. 0.08 ca. 0.2		
1 ... 10 1 ... 16	24	36	10 12, 23	ca. 0.2 ca. 0.4		
2 ... 25 4 ... 40	40	75	10 12, 23	ca. 0.5 ca. 1.0		

SAMGONG VOS	DESCRIPTION : PRESSURE SWITCH (type : 900)	DATE	BY	CHECKED	APPROVED
		10.06.15	D.S.Kim	V.S.Shon	Y.M.Cho
		SCALE	DWG. NO.		REV.
		NONE	SV6TD010		△





GENERAL SPECIFICATION

1. INDUSTRIAL PRESSURE GAUGE
2. ELEMENT : BOURDON TUBE
3. ACCURACY : ±1.5 OF FULL SCALE
4. MATERIAL : ELEMENT, SHANK / SUS316
   CASE, COVER, MOVEMENT / SUS304
5. LIQUID FILLED TYPE
6. RANGE : 0 ~ 2 MPa

TAG NO.
1205-1
1205-2
1205-3

SAMGONG VOS

DESCRIPTION :

FUEL PRESSURE GAUGE

DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho

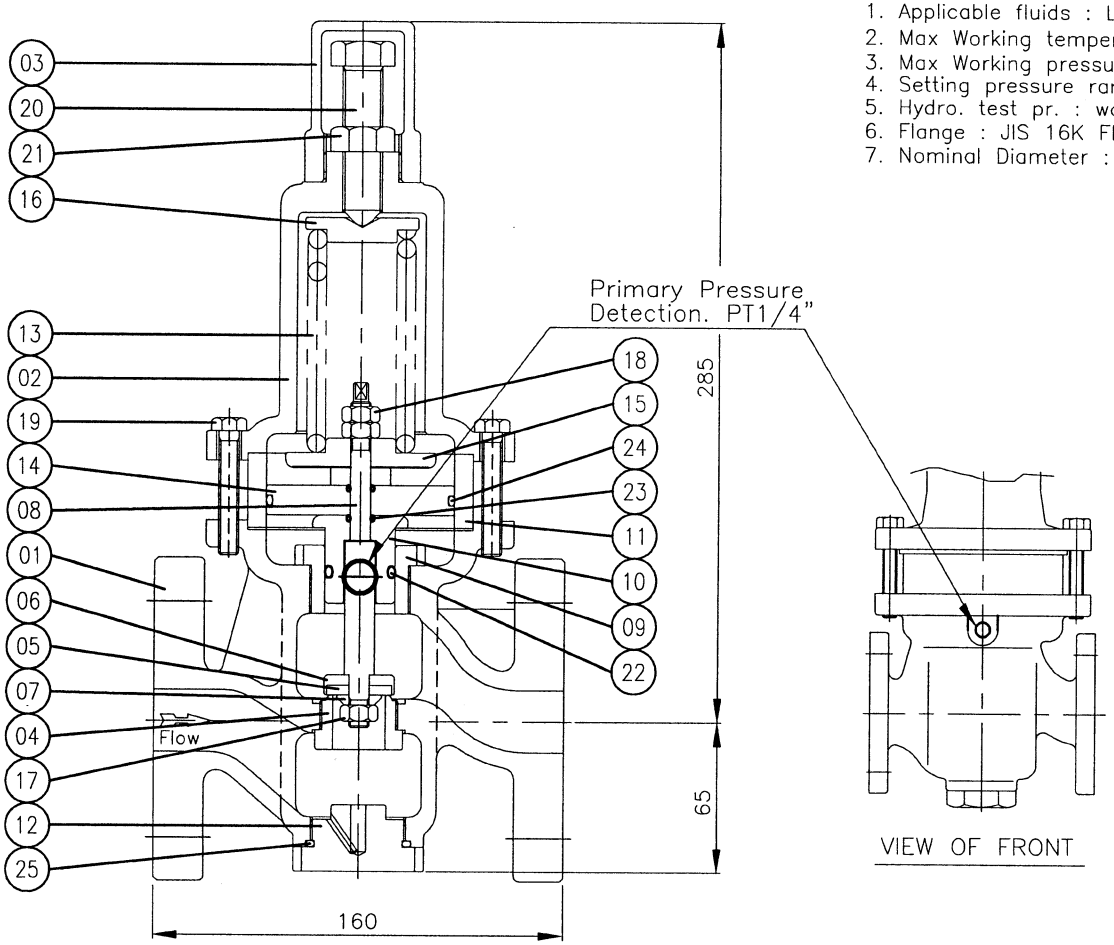
SCALE	DWG. NO.	REV.
NONE	SVPD011	△

CONTROL NO. : SH0501V - 78 / 119

Specifications

1. Applicable fluids : Liquid, Oil
2. Max Working temperature : Max. 180°C
3. Max Working pressure : 16K
4. Setting pressure range : 0.5 to 12K
5. Hydro. test pr. : working pr. x 1.5
6. Flange : JIS 16K FF
7. Nominal Diameter : 20A

TAG NO.
1206



VIEW OF FRONT

NO.	DESCRIPTION	Q'TY	MAT'L
25	GASKET	1	NON-ASBESTOS
24	O-RING	1	VITON(FPM)
23	O-RING	2	VITON(FPM)
22	O-RING	1	VITON(FPM)
21	NUT	1	SS 200
20	ADJUST SCREW	1	SS 200
19	BOLT	6	SS 200
18	LOCK NUT	2	SUS 304
17	LOCK NUT	1	SUS 304
16	UPPER SPRING SEAT	1	SS 400
15	LOWER SPRING SEAT	1	SS 400
14	PISTON	1	SUS 304
13	SPRING	1	SWOSC
12	PLUG	1	SS 400
11	CYLINDER	1	SUS 304
10	STEM GUIDE	1	SUS 304
09	BUSHING	1	SUS 304
08	STEM	1	SUS 304
07	DISC WASHER	1	SUS 304
06	DISC HOLDER	1	SUS 304
05	DISC	1	VITON(FPM)
04	SEAT	1	SUS 304
03	CAP	1	SS 400
02	BONNET	1	FCD 450
01	BODY	1	FCD 450

SAMGONG VOS

DESCRIPTION :

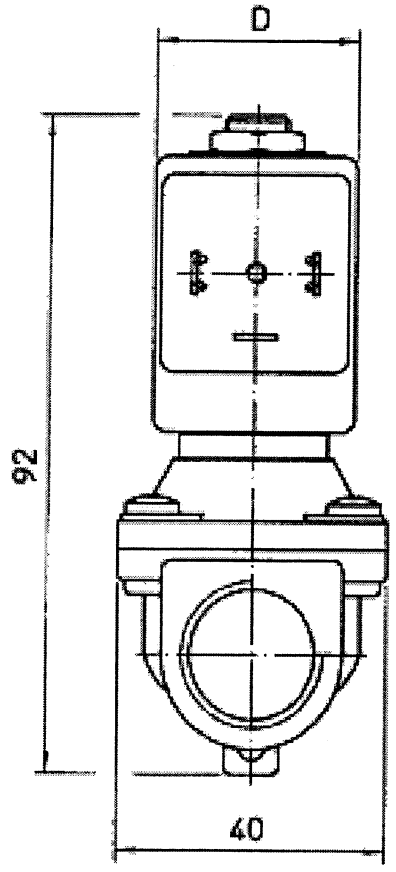
FUEL PRESSURE REGULATOR

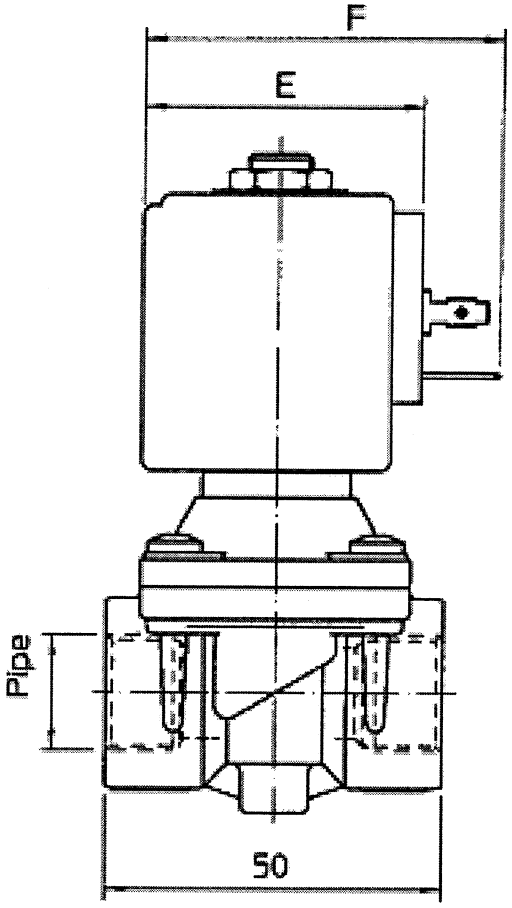
DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho

SCALE	DWG. NO.	REV.
NONE	SVPD012	△

CONTROL NO. : SH0501V - 79 / 119

TAG NO.
1207



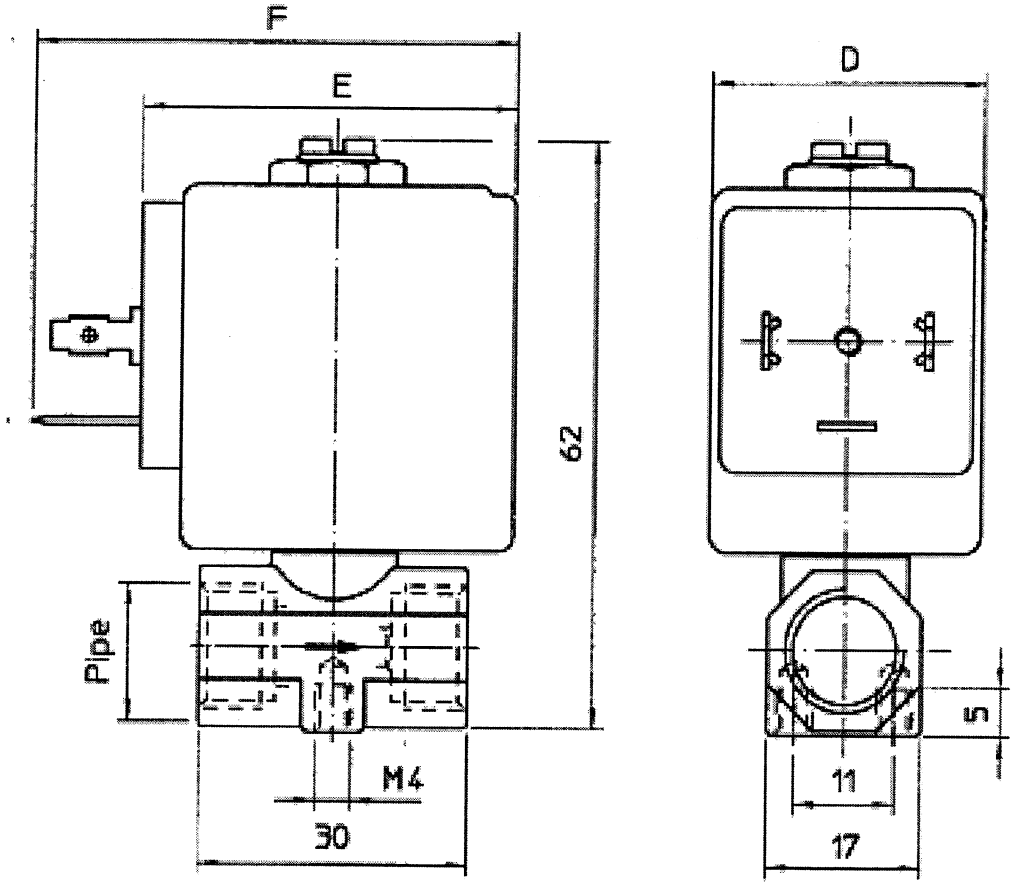


	Type	Pipe ISO 228/1
=>	21H7KV120	G 3/8
	21H8KV120	G 1/2

COIL	POWER ABSORPTION		TYPE	DIMENSIONS		
W ⎓	Inrush VA~	Hold VA~		D mm	E mm	F mm
8 W	25	14,5	B	30	42	54
			S	32		
12 W	35	25	U	36	48	60
14 W	43	27	G	52	55	67

	DESCRIPTION :	DATE	BY	CHECKED	APPROVED
SAMGONG VOS	PILOT BURNER SOLENOID VALVE	10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho
		SCALE NONE	DWG. NO. SV6TD013		REV

TAG NO.
1208
1209
1210

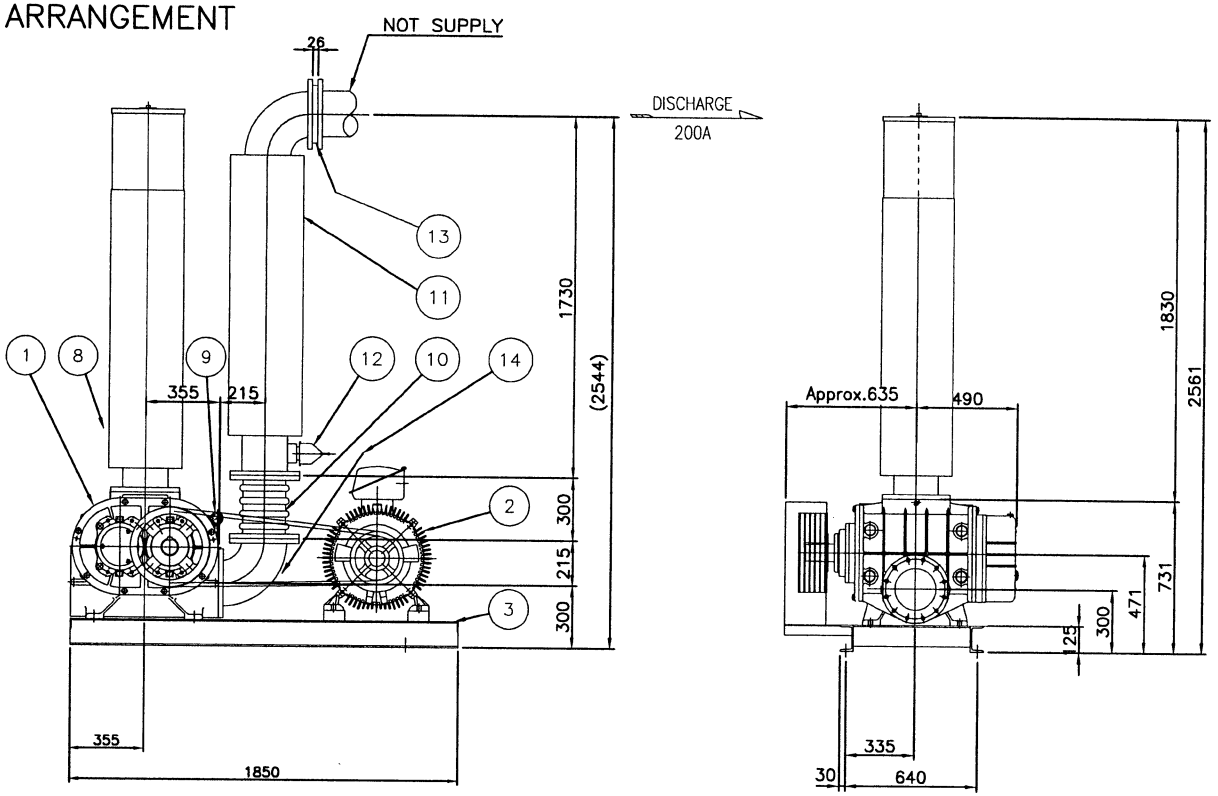


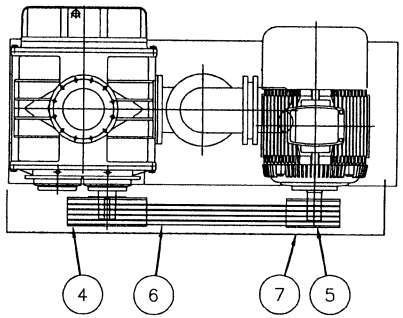
	Type	Pipe ISO 228/1
=>	21T1BV....-F	G 1/8
	21T2BV....-F	G 1/4

COIL	POWER ABSORPTION		TYPE	DIMENSIONS		
W ⎓	Inrush VA~	Hold VA~		D mm	E mm	F mm
8 W	25	14,5	B	30	42	54
			S	32		

	DESCRIPTION :	DATE	BY	CHECKED	APPROVED
SAMGONG VOS	SOLENOID VALVE	10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho
		SCALE NONE	DWG. NO. SV6TD014		REV △

ARRANGEMENT





MARK	DESCRIPTION	MAT'L	Q'TY	REMARK	PART NO.
1	BLOWER	–	1	T200	
2	MOTOR	–	1	–	
3	BED	SS400	1	–	
4	BLOWER PULLEY	GC200	1	–	
5	MOTOR PULLEY	GC200	1	–	
6	V-BELT	RUBBER	1SET	–	
7	BELT COVER	SS400	1	–	
8	SUCTION SILENCER	SS400	1	200A	
9	PRESSURE GAUGE	–	1	0~1kg/cm2	
10	EXPASION JOINT	SS400	1	200A	
11	DISCHARGE SILENCER	SS400	1	200A	
12	SAFETY VALVE	GC250	1	PT 3"	
13	CHECK VALVE	GC200	1	200A	
14	ELBOW	SPP	1	200A	

NOTE

1. *The Foundation Size is Reference Dimension.*
   ( ) is Reference Dimension.

TAG NO.
1301

CONTROL NO. : SH0501V – 82 / 119

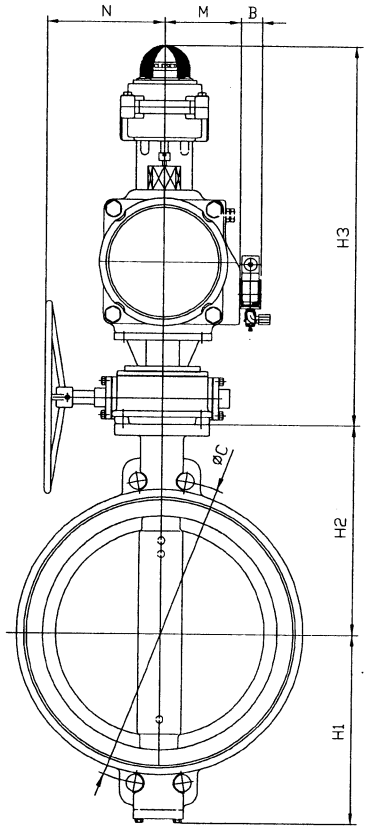
SAMGONG VOS

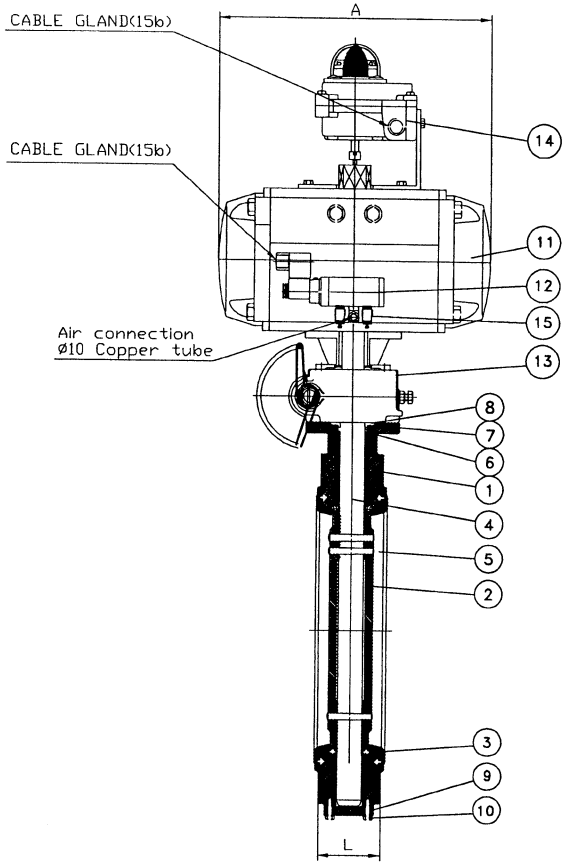
DESCRIPTION :

ROOTS BLOWER

DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho

SCALE	DWG. NO.	REV.
NONE	SV6TD015	△

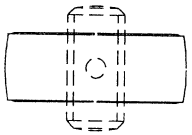




P.NO.	PART NAME	MATERIAL	Q'TY	REMARK
1	BODY	DUCTILE IRON	1	FCD450
2	DISC	ST.ST.	1	SCS14
3	SEAT	RUBBER	1	NBR
4	STEM	ST.ST.	1	SUS410
5	DISC PIN	ST.ST.	1set	SUS304
6	O-RING	RUBBER	2	NBR
7	GLAND BUSH	STEEL(G)	1	
8	GLAND BOLT	ST.ST.	1set	
9	BOTTOM COVER	STEEL	1	
10	BOTTOM BOLT	STEEL(G)	1set	
11	ACTUATOR	ASS'Y	1	
12	SOLENOID VALVE	ASS'Y	1	
13	DECLUTCH GEAR	ASS'Y	1	
14	LIMIT SWITCH BOX	ASS'Y	1	
15	SILENCER	ASS'Y	2	

ACTUATOR POSITION

P1



P3

TAG NO.
1304-1
1304-2

NOTES

1. HYDROSTATIC TEST

Check	Description		HYD. TEST PRESS	Working pressure
□	BODY		Working pressure × 1.5time	
	SEAT		Working pressure × 1.1time	
■	JIS 5K	BODY	7.5 Kg/cm²	
		SEAT	5.5 Kg/cm²	

2. BODY MARKING

ACE
5K
SIZE
MATERIAL

3. FLANGE FINISH : ■ N/A
4. ACTUATOR POSITION : P1
5. VALVE OPEN DEGREE : 45°~60°
6. IN CASE OF ACTUATOR DIMENSION, SEE FINAL PAGES FOR EACH ACTUATOR MODEL.

DIMENSIONS Unit : mm

NOMINAL DIAMETER	L	øC	REFERENCE (APPROX.)								Weight Approx. (Kg)
			H1	H2	H3	A	B	M	N	ACT MODEL	
200(8")	60	280	155	230	450	247	39	59	200	HP-88DA	24.5

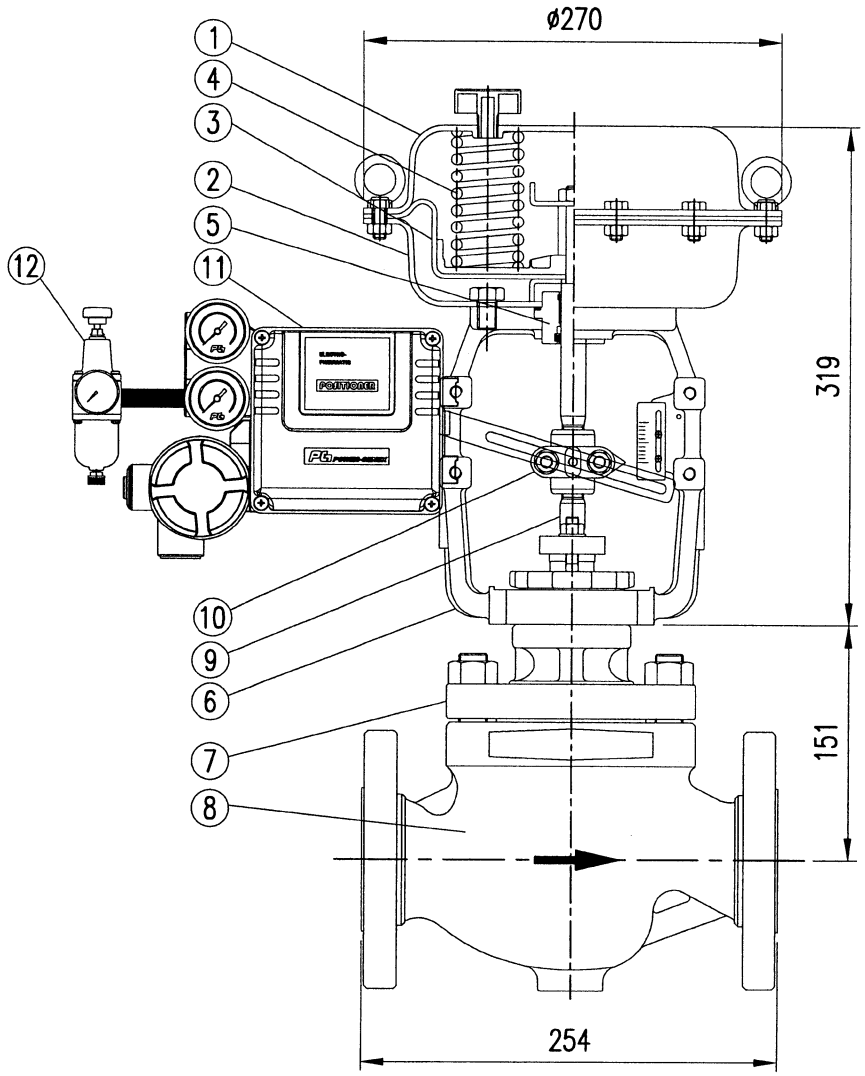
SAMGONG VOS

DESCRIPTION : START-UP VALVE

DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho

SCALE	DWG. NO.	REV.
NONE	SV6PD016	△

CONTROL NO. : SH0501V - 83 / 119



No.	PART NAME	MATERIAL	Q'TY
1	UP. DIAPHRAGM CASE	SPCC	1
2	LOW. DIAPHRAGM CASE	SPCC	1
3	DIAPHRAGM	E.P.D.M + NYLON	1
4	COIL SPRING	SPRING STEEL	1
5	GUIDE SEAL BOX	S45C	1
6	YOKE	FCD450	1
7	BONNET	SCS13	1
8	BODY	SCPH2	1
9	TRIM	SUS304	1
10	CONNECTOR	SUS304	1
11	E/P POSITIONER	–	1
12	AIR FILTER REGULATOR	–	1

* FLANGE CONNECTION : JIS 10K–50A

TAG NO.
1306

CONTROL NO. : SH0501V – 84 / 119

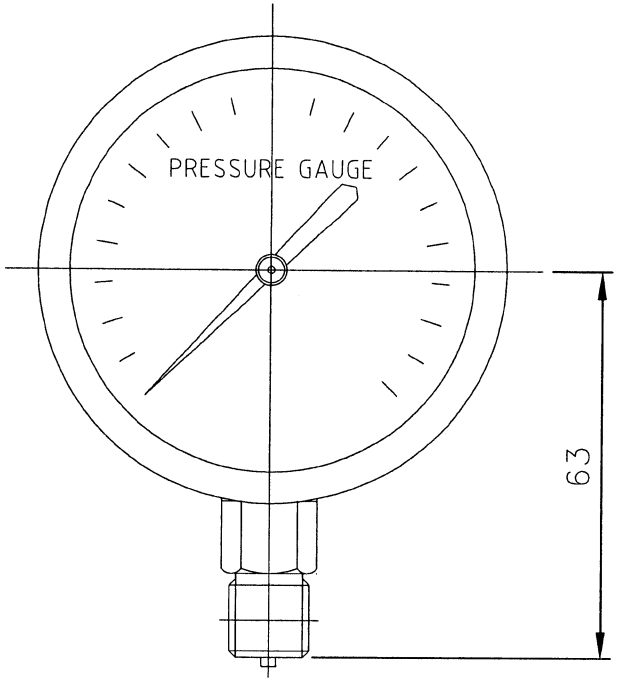
SAMGONG VOS

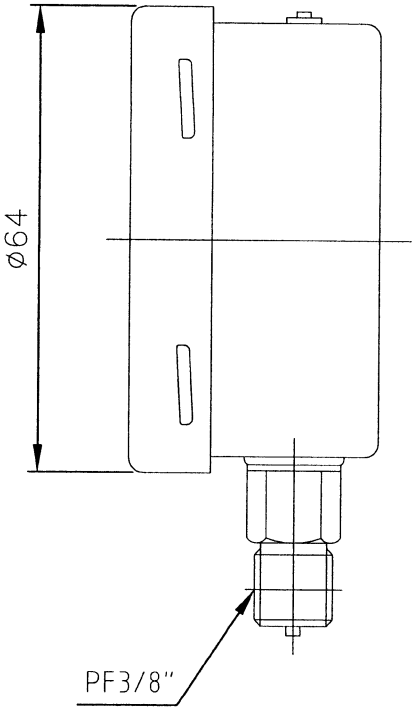
DESCRIPTION :

OXYGEN TRIM VALVE
(2-WAY GLOBE CONTROL VALVE)

DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho

SCALE	DWG. NO.	REV.
NONE	SVPD017	△





GENERAL SPECIFICATION

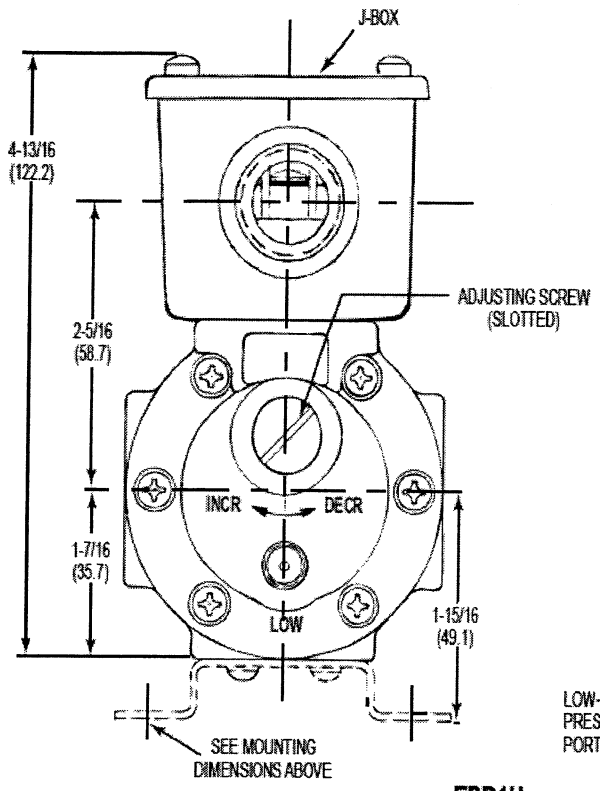
1. INDUSTRIAL PRESSURE GAUGE
2. ELEMENT : BOURDON TUBE
3. ACCURACY : ±1.5 OF FULL SCALE
4. MATERIAL : ELEMENT, SHANK / SUS316
   CASE, COVER, MOVEMENT / SUS304
5. LIQUID FILLED TYPE
6. RANGE : 0 ~ 5000 mmH_2O

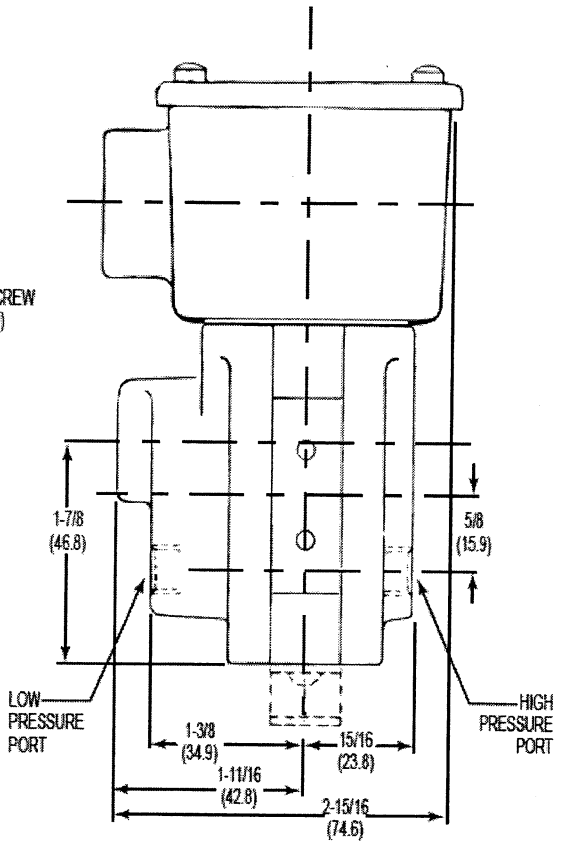
TAG NO.
1307

CONTROL NO. : SH0501V - 85 / 119

	DESCRIPTION :	DATE	BY	CHECKED	APPROVED
SAMGONG VOS	PRESSURE GAUGE	10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho
		SCALE: NONE	DWG. NO.: SVPD018	REV. △	

TAG NO.
1308





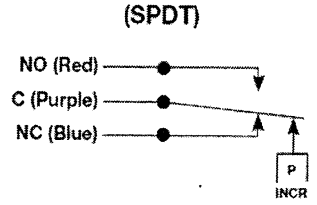
EPD1H

Electrical Characteristics:	All models incorporate Underwriters Laboratories, Inc. and CSA Listed single pole double throw snap-action switching elements
Accuracy:	± 5% of the adjustable range
Switch:	
Type:	SPDT snap action
Rating:	4 amps @ 125/250 VAC (Class AA limit switch); 5 amps @ 125/250 VAC (Class BB limit switch).
Wetted Parts:	
Process Fitting:	Polysulfone, 40% glass filled
Diaphragm:	Dacron reinforced neoprene
Enclosure:	Polysulfone, 40% glass filled
Electrical Connection:	
EPD1S Models:	12" free leads
EPD1H Models:	3-contact terminal block

* See product configurator for additional options.

Enclosure Ratings:	NEMA 4 on EPD1H
Pressure Connection:	1/8" NPT female
Temperature Range:	
Operating:	-20° to +165°F (-54° to +74°C)
Storage:	-65° to +200°F (-40° to 93°C)
Adjustment Instructions:	Turn adjustment screw clockwise to increase, counter-clockwise to decrease pressure difference (switch setting)
Shipping Weight:	
EPD1S Models:	1.0 lbs. approximate
EPD1H Models:	1.5 lbs. approximate

Wiring Diagram

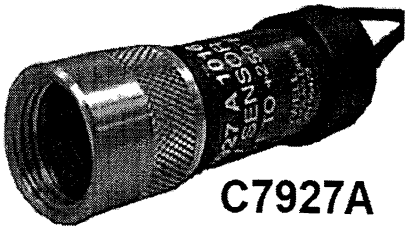


SAMGONG VOS	DESCRIPTION : DIFFERENTIAL AIR PRESSURE SWITCH	DATE 10.06.15	BY D.S.Kim	CHECKED U.S.Shon	APPROVED Y.M.Cho
		SCALE NONE	DWG. NO. SV6TD019		REV

TAG NO.
1405

Flame Detector:

Ambient Operating Temperature Ratings:
C7927A1016 (U.S. Version): -40°F to +200°F (-40°C to +93°C).
C7927A1008 (European Version): -4°F to +140°F (-20°C to +60°C).



Storage Temperature Rating: -20°F to +120°F (-28°C to +49°C).

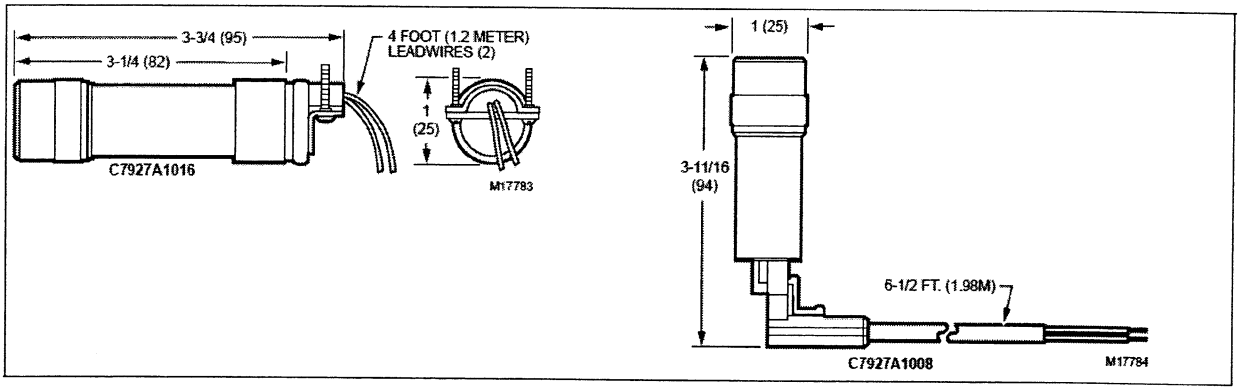
Maximum Pressure Rating: 5 psi 34.5 kPa).

Mounting: Collar with 1/2-14 NPSM internal threads for mounting on a 1/2 in. (13mm) sight pipe.

Wiring Connections: Two four-foot (1.2 meter) color-coded NEC Class 1 leadwires. Rear of detector has a clamp-type connector for 1/2 in. (13mm) flexible metal conduit.

Dimensions: See Fig. 4 and 5.

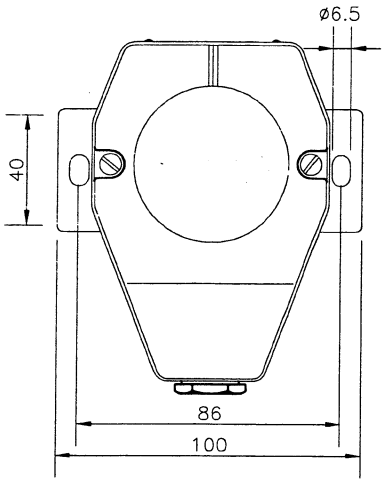
Approvals:
Underwriters Laboratories Inc. (UL): Pending.
Factory Mutual (FM): Pending.
IAS: Pending.

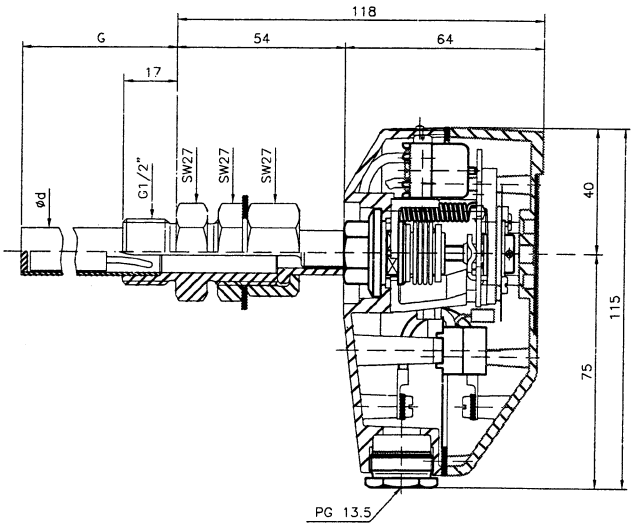


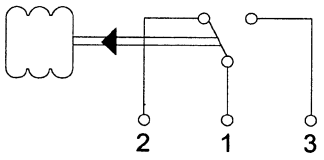
SAMGONG VOS	DESCRIPTION :	DATE	BY	CHECKED	APPROVED
	FLAME DETECTORS	10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho
		SCALE NONE	DWG. NO. SV6TD020		REV △

CONTROL NO. : SH0501V – 88 / 119

TAG NO.
1415







Connections

(Information)

. Salt mist tested
. Oil proof sealings
. Accuracy ±2% of full scale
. Viraction resistance to 4g (GL)
. Set poing point drift due to ambient temperature drift from 20℃ to 55℃ , samaller than 2.5 ℃.

(Microswitch ratings)

. Switch type No. 23, 26 and 12
- AC 250V ~ 10 (3) A
- DC 12V - 2A, 24V - 2A, 110V - 0.5A, 250V - 0.25A

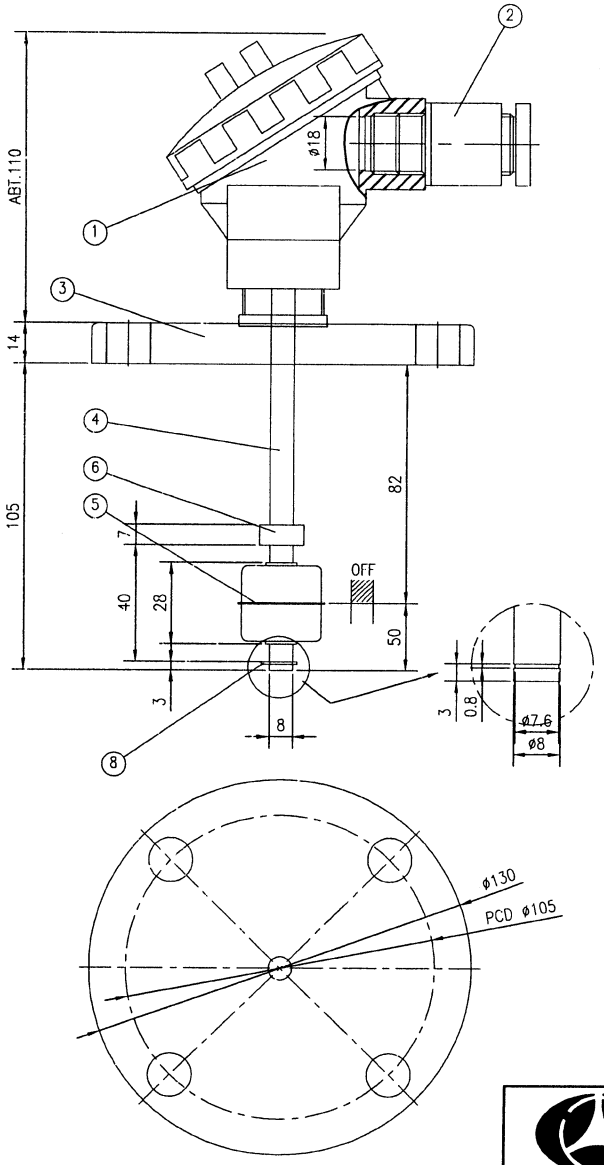
(Specifications)

Range in ℃	Sensor max. ℃	Switch type No.	Switching diff. K (℃)	Sensor length (G)	Cable length (L)
20 ... 110	115	23 26	2.0 3.5	G=65 G=110 G=130 G=150	L=1000 L=3000 L=5000 L=8000
20 ... 150	165	23 26	2.5 5.0		
40 ... 300	330	23 26	7.0 7.0		

Max. housing temperature : -30 ... +70 ℃
Preuusre proofness of protection tube : max. 25bar

DESCRIPTION :	DATE	BY	CHECKED	APPROVED
TEMPERATURE SWITCH (type : 471.2331)	10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho
	SCALE: NONE	DWG. NO.: SV6TD021	REV.	

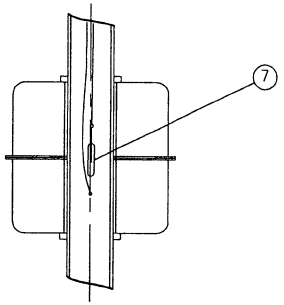
SAMGONG VOS



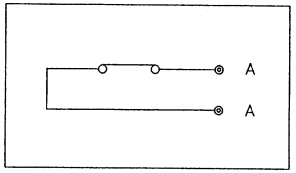
SPECIFICATION

1. MOUNTIG : TOP MOUNTING
2. MAX. PRESSURE : 0.3 MPa
3. MAX. TEMPERATURE : 100°C
4. SWITCH TYPE : REED SWITCH, DC 24V 0.1A/ 2 x SPST (2C2D)
5. ENCLOSURE : IP56

DETAIL REED SWITCH



WIRING DIAGRAM



TAG NO.
1607

NO.	PART NAME	SIZE	MAT'L	Q'TY
8	SNAP RING		SUS304	1
7	REED SWITCH		–	1
6	STOPPER		SUS304	1
5	FLOAT		SUS304	1
4	GUIDE PIPE		SUS304	1
3	FLANGE	5K 50A	SUS304	1
2	CABLE GLAND	JIS 15	BS	1
1	COVER & BODY		AL	1

SAMGONG VOS

DESCRIPTION :

LEVEL SWITCH

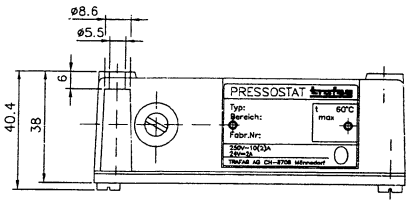
DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho

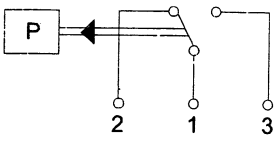
SCALE	DWG. NO.	REV.
NONE	SVPD022	△

CONTROL NO. : SH0501V – 89 / 119

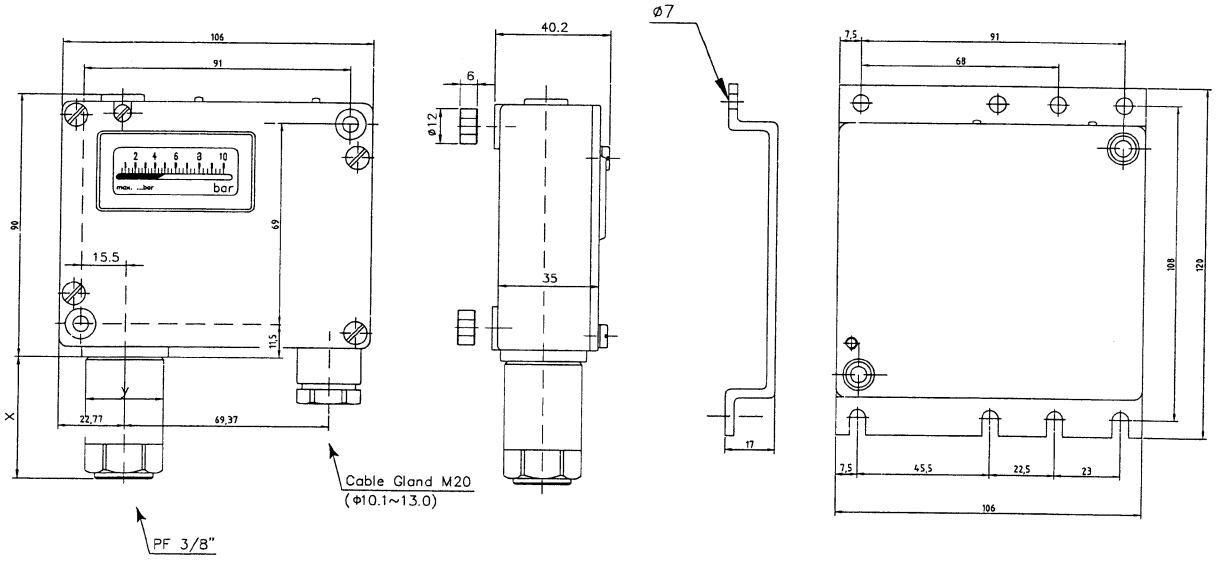
CONTROL NO. : SH0501V – 90 / 119

TAG NO.
1608





Connections



Mounting bracket No.31

(Single stage Controller)

. Robust aluminium die cast housing, epoxy coated
. Accuracy ±2% of full scale
. Rapeatability < ±0.5% of full scale
. Protection IP65
. Any mounting position possible
. Electrical connection to thress point terminal inside housing

(Microswitch ratings)

. Switch type No.11, 23 and 26
- AC 380V ~ 15 (3) A
- DC 220V - 0.2 (0.02) A 110V - 0.4 (0.03) A
24V - 6 (2) A 12V - 15 (8) A

. Switch type No.10
- AC 250V ~ 10 (2) A
- DC 220V - 0.2 (0.01) A 110V - 0.4 (0.02) A
24V - 2.0 (1.0) A 12V - 15 (7) A

(Specifications)

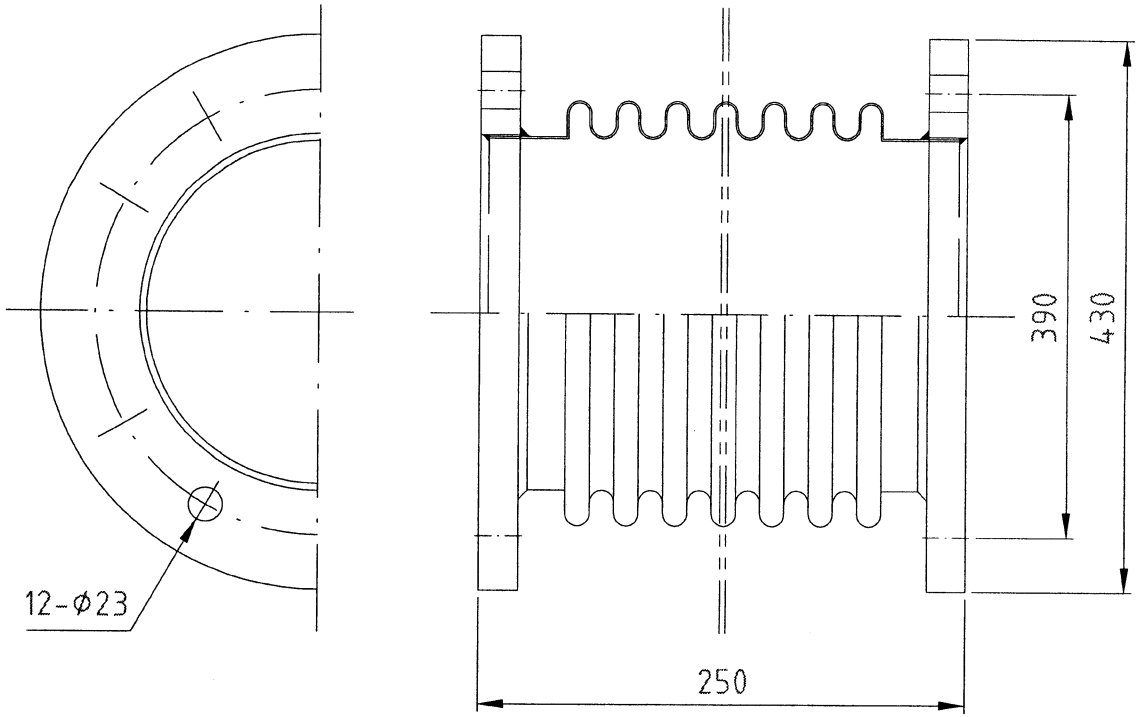
Pressure range in bar	max. working Pressure in bar	max. short time over pressure in bar	Switch type number	Switching differential in bar	Ambient temperature	Media temperature
-0.9 ... 1.5 0.2 ... 1.6 0.2 ... 2.5	10	13	10 12, 23	ca. 0.03 ca. 0.06	-20 ... +70°C	-40 ... +150°C
0 ... 4 0 ... 6	12	26	10 12, 23	ca. 0.08 ca. 0.2		
1 ... 10 1 ... 16	24	36	10 12, 23	ca. 0.2 ca. 0.4		
2 ... 25 4 ... 40	40	75	10 12, 23	ca. 0.5 ca. 1.0		

SAMGONG VOS

DESCRIPTION :
PRESSURE SWITCH
(type : 900)

DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	V.S.Shon	Y.M.Cho

SCALE	DWG. NO.	REV.
NONE	SV6TD023	△



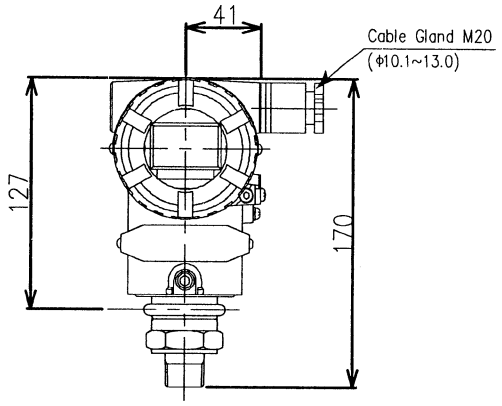
TAG NO.
1609

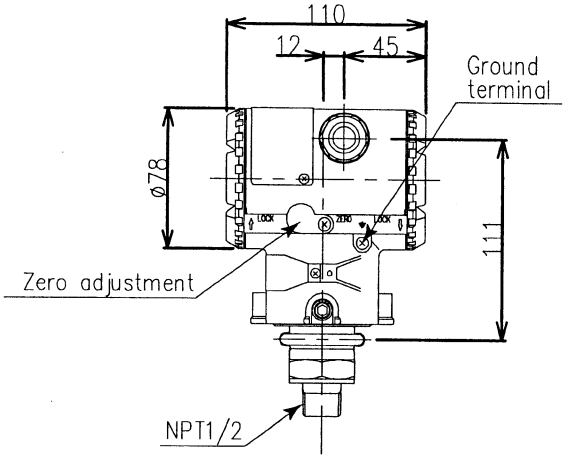
NOTE

1. FLANGE CONNECTION : JIS 5K–300A
2. MATERIAL : FLANGE / SS400
   BELLOWS / SUS316L

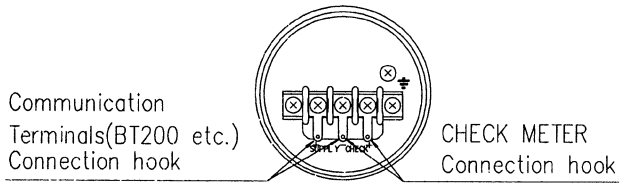
	DESCRIPTION :	DATE	BY	CHECKED	APPROVED
SAMGONG VOS	VENT LINE EXPANSION JOINT	10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho
		SCALE: NONE	DWG. NO.: SV6PD024		REV.

CONTROL NO. : SH0501V – 91 / 119





* Terminal Configuration



* Terminal Wiring

SUPPLY + −	Power supply and output terminal
CHECK + −	External indicator(ammeter) terminal
⏚	Ground terminal

NOTE

1. Maker : YOKOGAWA
2. Type : EJA530A (Gauge P.T)
3. Working Range : 0 to 0.5 kg/cm^2

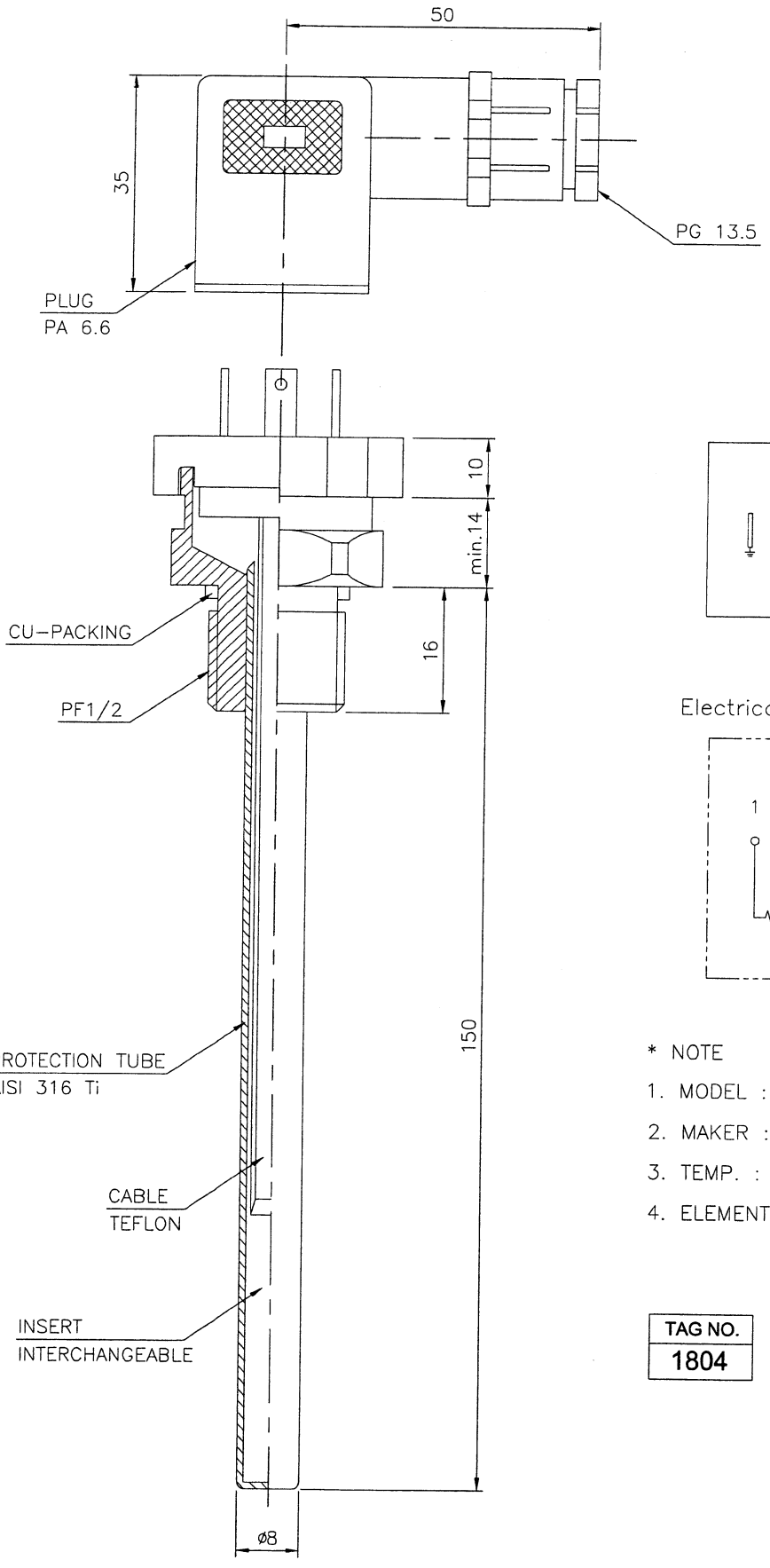
TAG NO.
1803

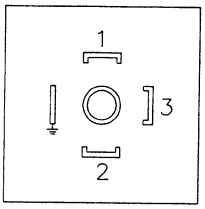
SAMGONG VOS

DESCRIPTION :	DATE	BY	CHECKED	APPROVED
BACK PRESSURE TRANSMITTER	10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho
	SCALE: NONE	DWG. NO.: SVPD025	REV.	

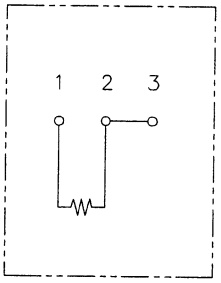
CONTROL NO. : SH0501V - 92 / 119

CONTROL NO. : SH0501V – 93 / 119





Electrical connection



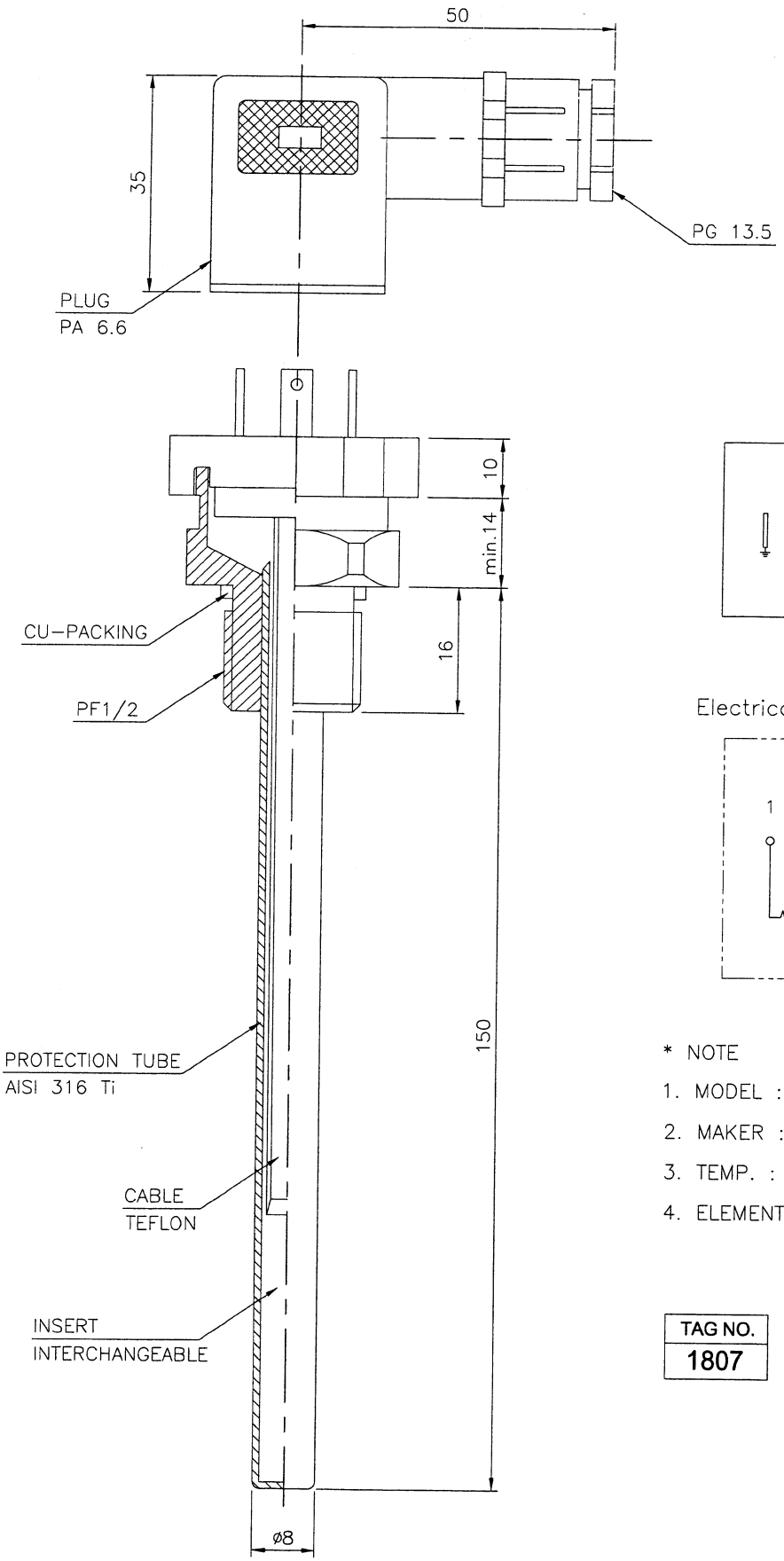
* NOTE

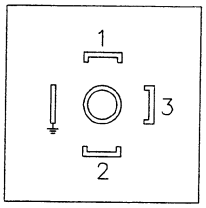
1. MODEL : MBT5250
2. MAKER : DANFOSS
3. TEMP. : 0~200°C
4. ELEMENT : PT100Ω at 0°C

TAG NO.
1804

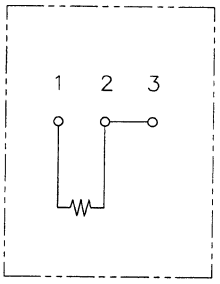
SAMGONG VOS	DESCRIPTION : GAS TEMPERATURE TRANSMITTER	DATE 10.06.15	BY D.S.Kim	CHECKED U.S.Shon	APPROVED Y.M.Cho
		SCALE NONE	DWG. NO. SV6PD026		REV. △

CONTROL NO. : SH0501V – 94 / 119





Electrical connection

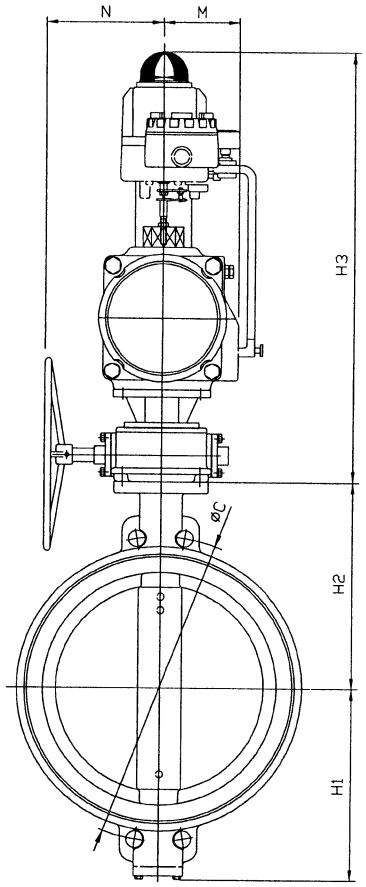


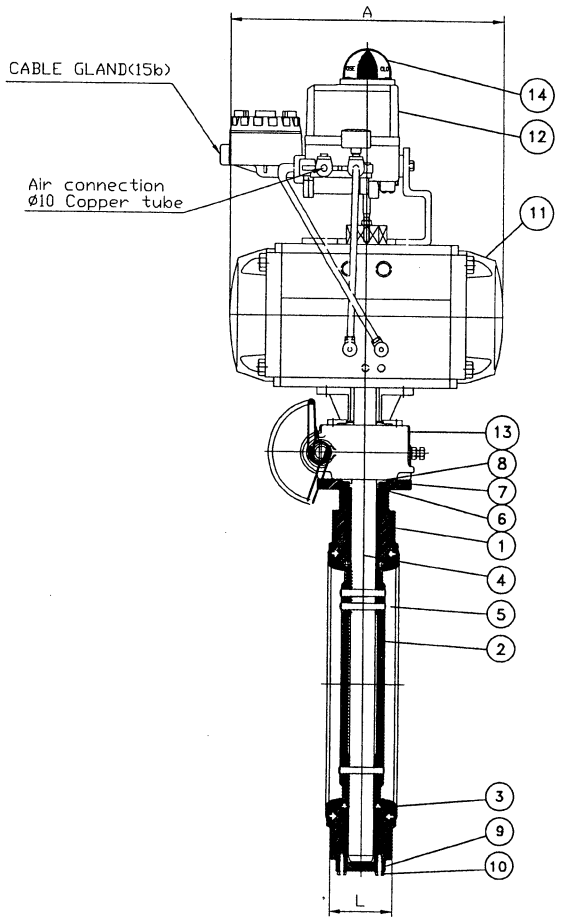
* NOTE

1. MODEL : MBT5250
2. MAKER : DANFOSS
3. TEMP. : 0~200°C
4. ELEMENT : PT100Ω at 0°C

TAG NO.
1807

SAMGONG VOS	DESCRIPTION : WATER TEMPERATURE TRANSMITTER	DATE 10.06.15	BY D.S.Kim	CHECKED U.S.Shon	APPROVED Y.M.Cho
		SCALE NONE	DWG. NO. SV6PD027		REV. △

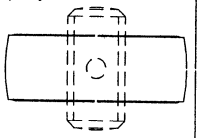




P.NO.	PART NAME	MATERIAL	Q'TY	REMARK
1	BODY	DUCTILE IRON	1	FCD450
2	DISC	ST.ST.	1	SCS14
3	SEAT	RUBBER	1	NBR
4	STEM	ST.ST.	1	SUS410
5	DISC PIN	ST.ST.	1set	SUS304
6	O-RING	RUBBER	2	NBR
7	GLAND BUSH	STEEL(G)	1	
8	GLAND BOLT	ST.ST.	1set	
9	BOTTOM COVER	STEEL	1	
10	BOTTOM BOLT	STEEL(G)	1set	
11	ACTUATOR	ASS'Y	1	
12	POSITIONER	ASS'Y	1	RA TYPE
13	DECLUTCH GEAR	ASS'Y	1	
14	LIMIT SWITCH	ASS'Y	1	

ACTUATOR POSITION

P1



P3

TAG NO.

1901

NOTES

1. HYDROSTATIC TEST

Check	Description		HYD. TEST PRESS	Working pressure
□	BODY		Working pressure x 1.5time	
	SEAT		Working pressure x 1.1time	
■	JIS 5K	BODY	7.5 Kg/cm²	
		SEAT	5.5 Kg/cm²	

2. BODY MARKING

ACE
5K
SIZE
MATERIAL

3. FLANGE FINISH : ■ N/A
4. ACTUATOR POSITION : P1
5. IN CASE OF ACTUATOR DIMENSION,
SEE FINAL PAGES FOR EACH ACTUATOR MODEL.

DIMENSIONS Unit : mm

NOMINAL DIAMETER	L	øC	REFERENCE (APPROX.)							Weight Approx. (Kg)
			H1	H2	H3	A	M	N	ACT MODEL	
300(12")	78	390	251	310	444	347	82	200	HP-125DA	52.0

SAMGONG VOS

DESCRIPTION :

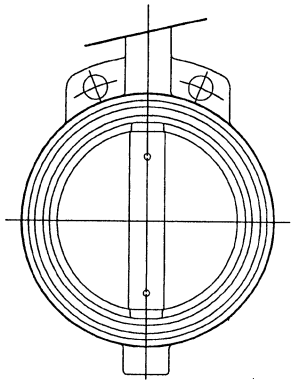
BACK PRESSURE CONTROL VALVE
(VENT-TO-ATMOSPHERE)

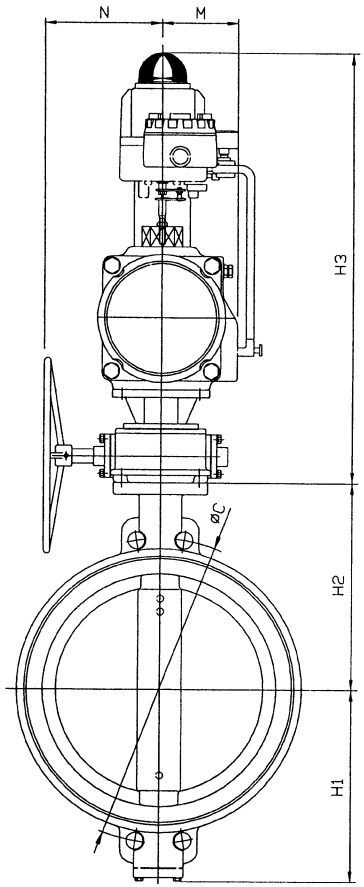
DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho

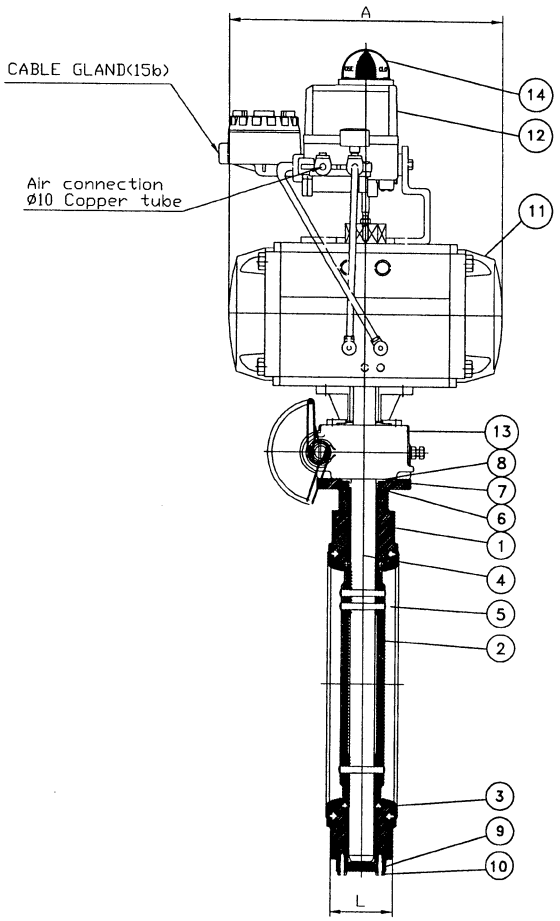
SCALE	DWG. NO.	REV.
NONE	SV6PD028	△

CONTROL NO. : SH0501V - 95 / 119

ND 200(08") & UNDER



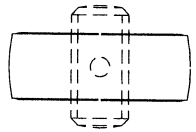




P.NO.	PART NAME	MATERIAL	Q'TY	REMARK
1	BODY	DUCTILE IRON	1	FCD450
2	DISC	ST.ST.	1	SCS14
3	SEAT	RUBBER	1	NBR
4	STEM	ST.ST.	1	SUS410
5	DISC PIN	ST.ST.	1set	SUS304
6	O-RING	RUBBER	2	NBR
7	GLAND BUSH	STEEL(G)	1	
8	GLAND BOLT	ST.ST.	1set	
9	BOTTOM COVER	STEEL	1	
10	BOTTOM BOLT	STEEL(G)	1set	
11	ACTUATOR	ASS'Y	1	
12	POSITIONER	ASS'Y	1	RA TYPE
13	DECLUTCH GEAR	ASS'Y	1	
14	LIMIT SWITCH	ASS'Y	1	

ACTUATOR POSITION

P1



P3

TAG NO.
1902

NOTES

1. HYDROSTATIC TEST

Check	Description		HYD. TEST PRESS	Working pressure
□	BODY		Working pressure x 1.5time	
	SEAT		Working pressure x 1.1time	
■	JIS 5K	BODY	7.5 Kg/cm²	
		SEAT	5.5 Kg/cm²	

2. BODY MARKING

ACE
5K
SIZE
MATERIAL

3. FLANGE FINISH : ■ N/A
4. ACTUATOR POSITION : P1
5. SINGLE ACTING ACTUATOR
   - NORMAL POSITION CLOSE
6. IN CASE OF ACTUATOR DIMENSION,
   SEE FINAL PAGES FOR EACH ACTUATOR MODEL.

DIMENSIONS — Unit : mm

NOMINAL DIAMETER	L	øC	REFERENCE (APPROX.)							Weight Approx. (Kg)
			H1	H2	H3	A	M	N	ACT MODEL	
80(3")	46	145	75	150	358	144	42	200	HP-50DA	15.0

SAMGONG VOS

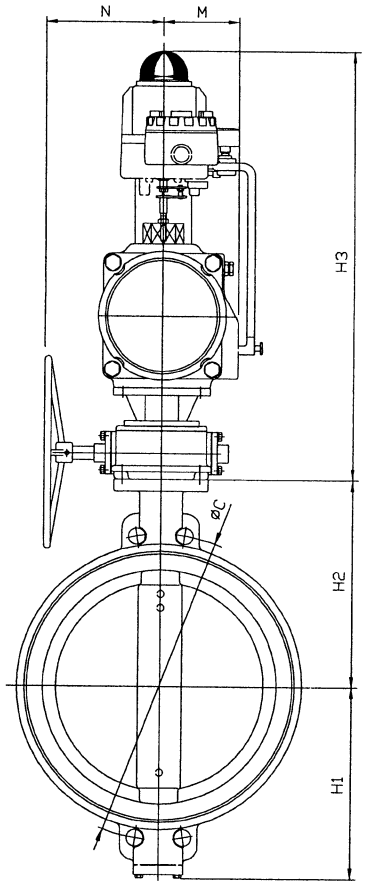
DESCRIPTION :

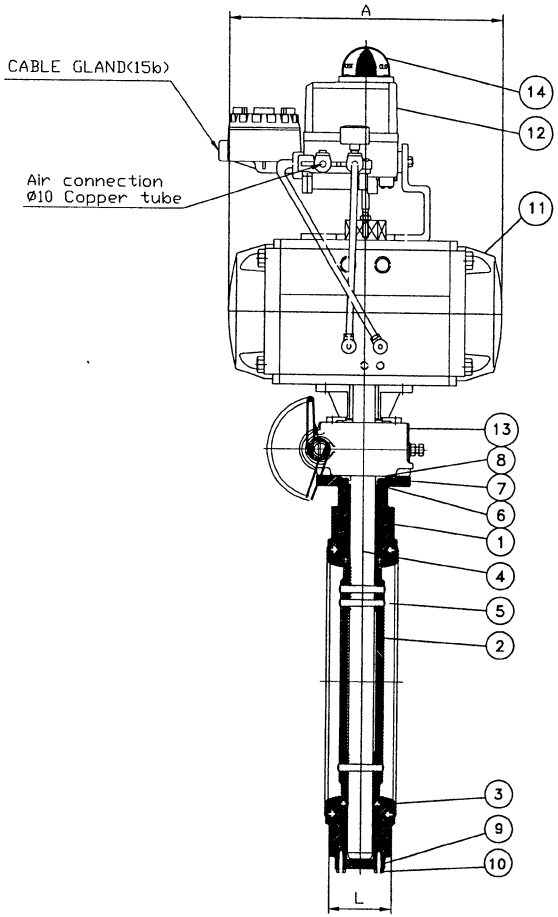
A.P.TANK DELIVERY CONTROL VALVE

DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho

SCALE	DWG. NO.	REV.
NONE	SV6PD029	△

CONTROL NO. : SH0501V - 96 / 119

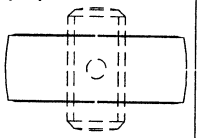




P.NO.	PART NAME	MATERIAL	Q'TY	REMARK
1	BODY	DUCTILE IRON	1	FCD450
2	DISC	ST.ST.	1	SCS14
3	SEAT	RUBBER	1	NBR
4	STEM	ST.ST.	1	SUS410
5	DISC PIN	ST.ST.	1set	SUS304
6	O-RING	RUBBER	2	NBR
7	GLAND BUSH	STEEL(G)	1	
8	GLAND BOLT	ST.ST.	1set	
9	BOTTOM COVER	STEEL	1	
10	BOTTOM BOLT	STEEL(G)	1set	
11	ACTUATOR	ASS'Y	1	
12	POSITIONER	ASS'Y	1	RA TYPE
13	DECLUTCH GEAR	ASS'Y	1	
14	LIMIT SWITCH	ASS'Y	1	

ACTUATOR POSITION

P1



P3

TAG NO.

1903

NOTES

1. HYDROSTATIC TEST

Check	Description		HYD. TEST PRESS	Working pressure
□	BODY		Working pressure x 1.5time	
	SEAT		Working pressure x 1.1time	
■	JIS 5K	BODY	7.5 Kg/cm²	
		SEAT	5.5 Kg/cm²	

2. BODY MARKING

ACE
5K
SIZE
MATERIAL

3. FLANGE FINISH : ■ N/A
4. ACTUATOR POSITION : P1
5. SINGLE ACTING ACTUATOR
   - NORMAL POSITION CLOSE
6. IN CASE OF ACTUATOR DIMENSION,
   SEE FINAL PAGES FOR EACH ACTUATOR MODEL.

DIMENSIONS Unit : mm

NOMINAL DIAMETER	L	øC	REFERENCE (APPROX.)							Weight Approx. (Kg)
			H1	H2	H3	A	M	N	ACT MODEL	
350(14")	78	435	270	335	516	497	107	200	HP-180S	76.5

SAMGONG VOS

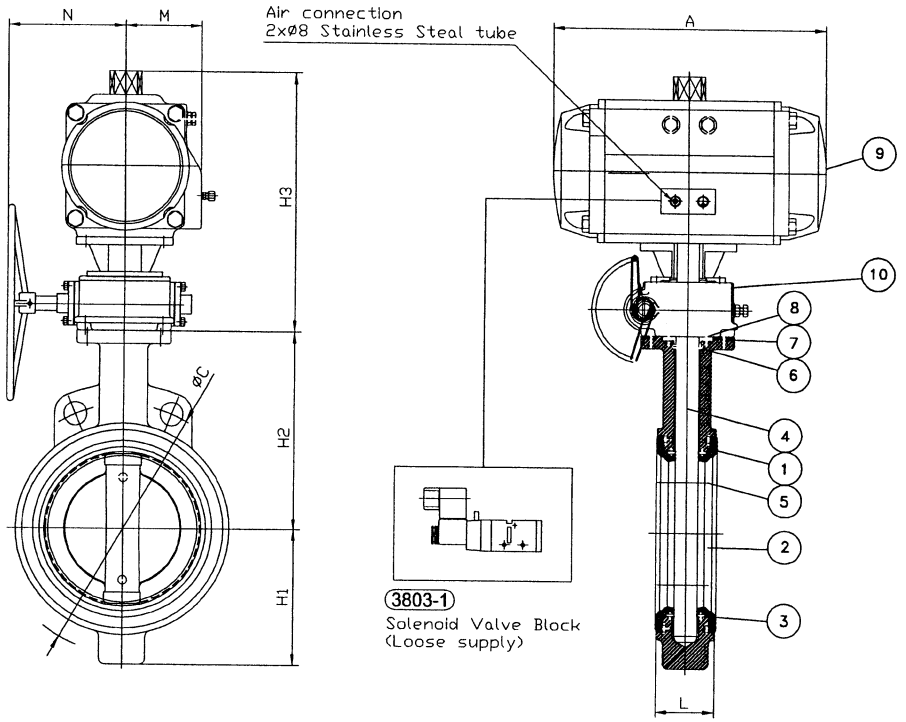
DESCRIPTION :

DELIVERY / PRESSURE CONTROL VALVE

DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	V.S.Shon	Y.M.Cho

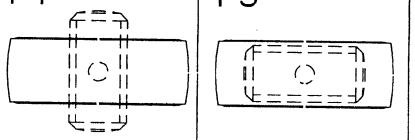
SCALE	DWG. NO.	REV.
NONE	SV6PD030	△

CONTROL NO. : SH0501V - 97 / 119



P.NO.	PART NAME	MATERIAL	Q'TY	REMARK
1	BODY	DUCTILE IRON	1	FCD450
2	DISC	ST.ST.	1	SCS14
3	SEAT	RUBBER	1	NBR
4	STEM	ST.ST.	1	SUS410
5	DISC PIN	ST.ST.	1set	SUS304
6	O-RING	RUBBER	2	NBR
7	GLAND BUSH	STEEL(G)	1	
8	GLAND BOLT	ST.ST.	1set	
9	ACTUATOR	ASS'Y	1	
10	DECLUTCH GEAR	ASS'Y	1	

ACTUATOR POSITION



TAG NO.
2002-1
2002-2

NOTES

1. HYDROSTATIC TEST

Check	Description		HYD. TEST PRESS	Working pressure
□	BODY		Working pressure x 1.5time	
	SEAT		Working pressure x 1.1time	
■	JIS 5K	BODY	7.5 Kg/cm²	
		SEAT	5.5 Kg/cm²	

2. BODY MARKING

ACE
5K
SIZE
MATERIAL

3. FLANGE FINISH : ■ N/A
4. ACTUATOR POSITION : P1
5. IN CASE OF ACTUATOR DIMENSION, SEE FINAL PAGES FOR EACH ACTUATOR MODEL.

DIMENSIONS Unit : mm

NOMINAL DIAMETER	L	øC	REFERENCE (APPROX.)								Weight Approx. (Kg)
			H1	H2	H3	A	B	M	N	ACT MODEL	
200(8")	60	280	155	230	300	247	–	59	200	HP-88DA	23.0

SAMGONG VOS

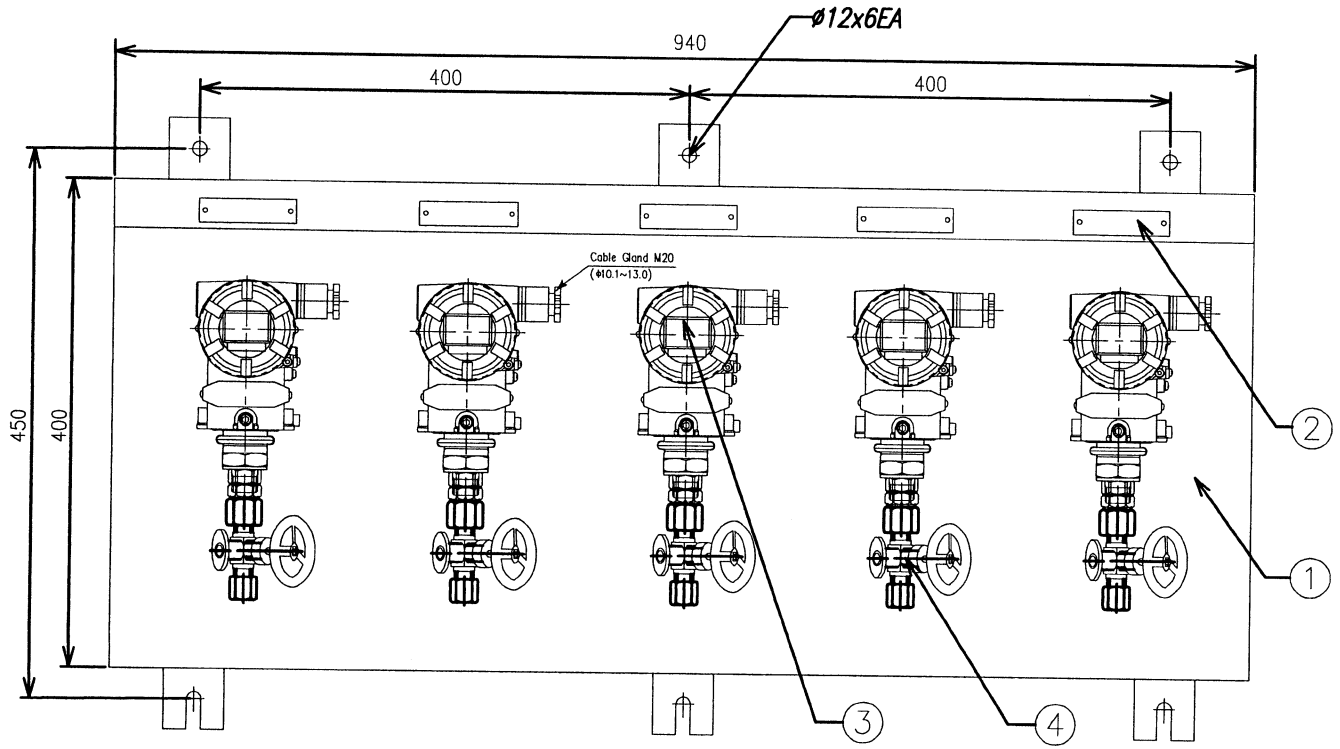
DESCRIPTION :

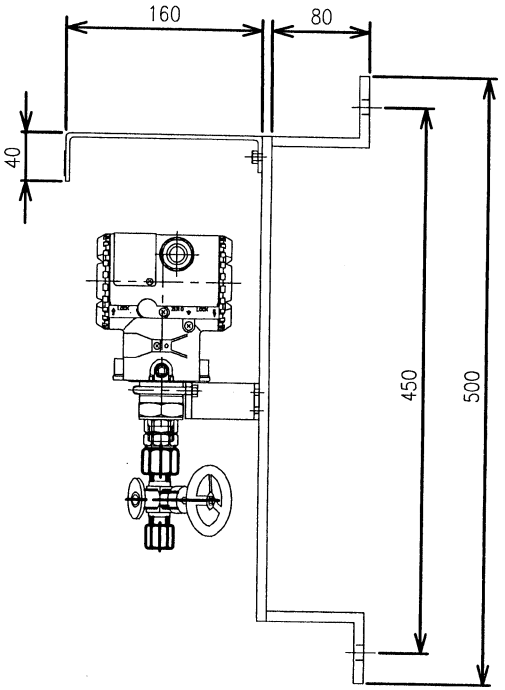
VENTURI GAS DELIVERY VALVE
(MAIN BALLAST LINE)

DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho

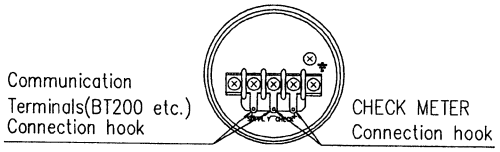
SCALE	DWG. NO.	REV.
NONE	SV6PD031	△

CONTROL NO. : SH0501V – 98 / 119





* Terminal Configuration



* Terminal Wiring

SUPPLY ±	Power supply and output terminal
CHECK ±	External indicator(ammeter) terminal
⏚	Ground terminal

NOTE

1. Maker : YOKOGAWA
2. Type : EJA510A (Absolute P.T)
3. Working Range : 0 to 3.5 kg/cm²

TAG NO.
2003-1
2003-2
2003-3
2003-4
2003-5

4	3-WAY TEST COCK	SUS316L	5	NPT1/2"xø10
3	PRESS. TRANSMITTER	SUS316L	5	
2	NAME PLATE	SUS316	5	80x20x1t
1	BOARD	SS400	1	940x400x8t

SAMGONG VOS

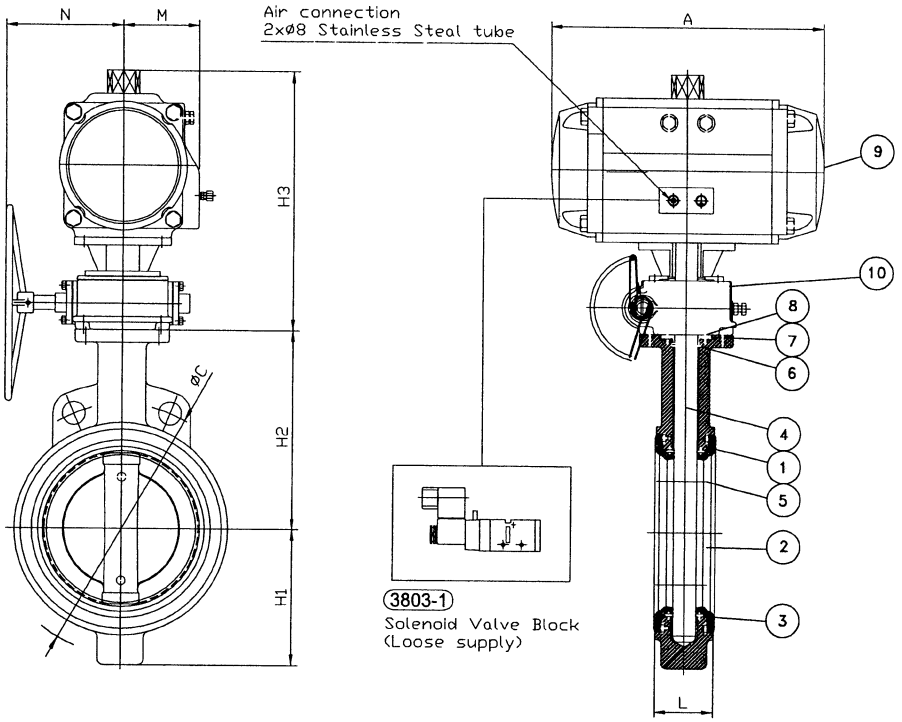
DESCRIPTION :

VENTURI PRESSURE TRANSMITTER (MAIN BALLAST LINE)

DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho

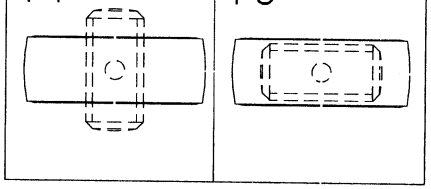
SCALE	DWG. NO.	REV.
NONE	SVPD032	△

CONTROL NO. : SH0501V - 99 / 119



P.NO.	PART NAME	MATERIAL	Q'TY	REMARK
1	BODY	DUCTILE IRON	1	FCD450
2	DISC	ST.ST.	1	SCS14
3	SEAT	RUBBER	1	NBR
4	STEM	ST.ST.	1	SUS410
5	DISC PIN	ST.ST.	1set	SUS304
6	O-RING	RUBBER	2	NBR
7	GLAND BUSH	STEEL(G)	1	
8	GLAND BOLT	ST.ST.	1set	
9	ACTUATOR	ASS'Y	1	
10	DECLUTCH GEAR	ASS'Y	1	

ACTUATOR POSITION



TAG NO.
2004-1
2004-2

NOTES

1. HYDROSTATIC TEST

Check	Description		HYD. TEST PRESS	Working pressure
□	BODY		Working pressure x 1.5time	
	SEAT		Working pressure x 1.1time	
■	JIS 5K	BODY	7.5 Kg/cm²	
		SEAT	5.5 Kg/cm²	

2. BODY MARKING

ACE
5K
SIZE
MATERIAL

3. FLANGE FINISH : ■ N/A
4. ACTUATOR POSITION : P1
5. IN CASE OF ACTUATOR DIMENSION, SEE FINAL PAGES FOR EACH ACTUATOR MODEL.

DIMENSIONS Unit : mm

NOMINAL DIAMETER	L	⌀C	REFERENCE (APPROX.)								Weight Approx. (Kg)
			H1	H2	H3	A	B	M	N	ACT MODEL	
100(4")	52	165	95	165	258	144	70	42	200	HP-50DA	14.5

SAMGONG VOS

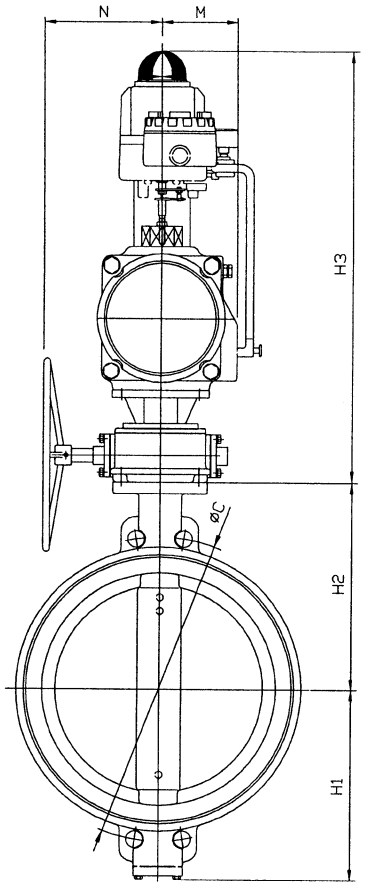
DESCRIPTION :

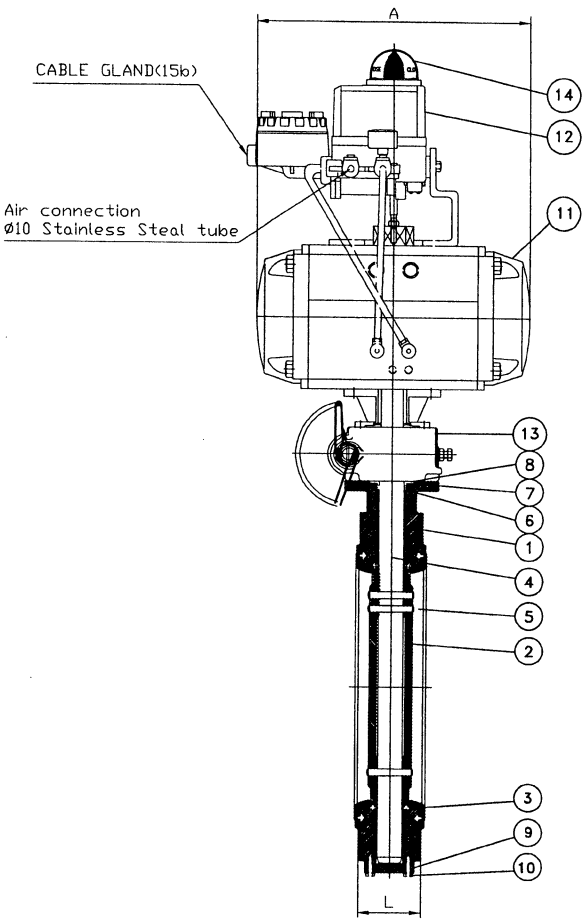
BALLAST REAERATION VALVE

DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho

SCALE	DWG. NO.	REV.
NONE	SV6PD033	△

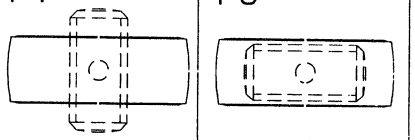
CONTROL NO. : SH0501V - 100 / 119





P.NO.	PART NAME	MATERIAL	Q'TY	REMARK
1	BODY	DUCTILE IRON	1	FCD450
2	DISC	ST.ST.	1	SCS14
3	SEAT	RUBBER	1	NBR
4	STEM	ST.ST.	1	SUS410
5	DISC PIN	ST.ST.	1set	SUS304
6	O-RING	RUBBER	2	NBR
7	GLAND BUSH	STEEL(G)	1	
8	GLAND BOLT	ST.ST.	1set	
9	BOTTOM COVER	STEEL	1	
10	BOTTOM BOLT	STEEL(G)	1set	
11	ACTUATOR	ASS'Y	1	
12	POSITIONER	ASS'Y	1	RA TYPE
13	DECLUTCH GEAR	ASS'Y	1	
14	LIMIT SWITCH	ASS'Y	1	

ACTUATOR POSITION



TAG NO.
2006-1
2006-2

NOTES

1. HYDROSTATIC TEST

Check	Description		HYD. TEST PRESS	Working pressure
□	BODY		Working pressure x 1.5time	
	SEAT		Working pressure x 1.1time	
■	JIS 5K	BODY	7.5 Kg/cm²	
		SEAT	5.5 Kg/cm²	

2. BODY MARKING

ACE
5K
SIZE
MATERIAL

3. FLANGE FINISH : ■ N/A
4. ACTUATOR POSITION : P1
5. IN CASE OF ACTUATOR DIMENSION, SEE FINAL PAGES FOR EACH ACTUATOR MODEL.

DIMENSIONS Unit : mm

NOMINAL DIAMETER	L	øC	REFERENCE (APPROX.)							Weight Approx. (Kg)
			H1	H2	H3	A	M	N	ACT MODEL	
600(24")	154	715	453	495	590	504	120	200	HP-211DA	288.0

SAMGONG VOS

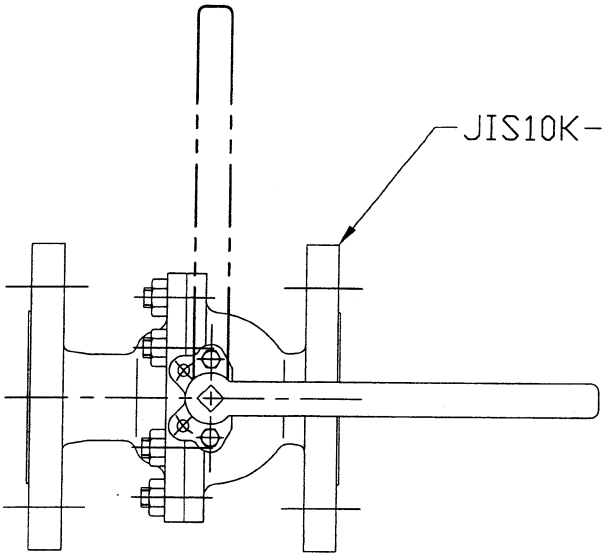
DESCRIPTION :

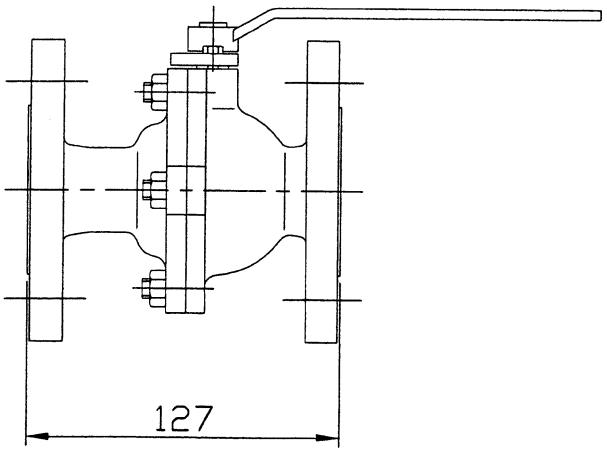
VENTURI BALLAST WATER REGULATING VALVE

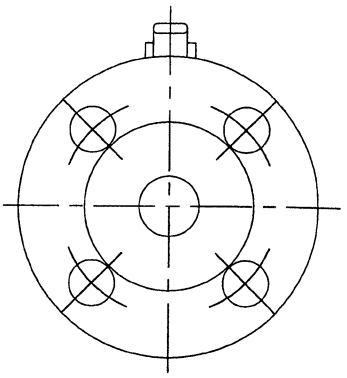
DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	V.S.Shon	Y.M.Cho

SCALE	DWG. NO.	REV.
NONE	SV6PD034	△

CONTROL NO. : SH0501V - 101 / 119







TAG NO.
2012
2013
2014
2106

* Material : SUS316

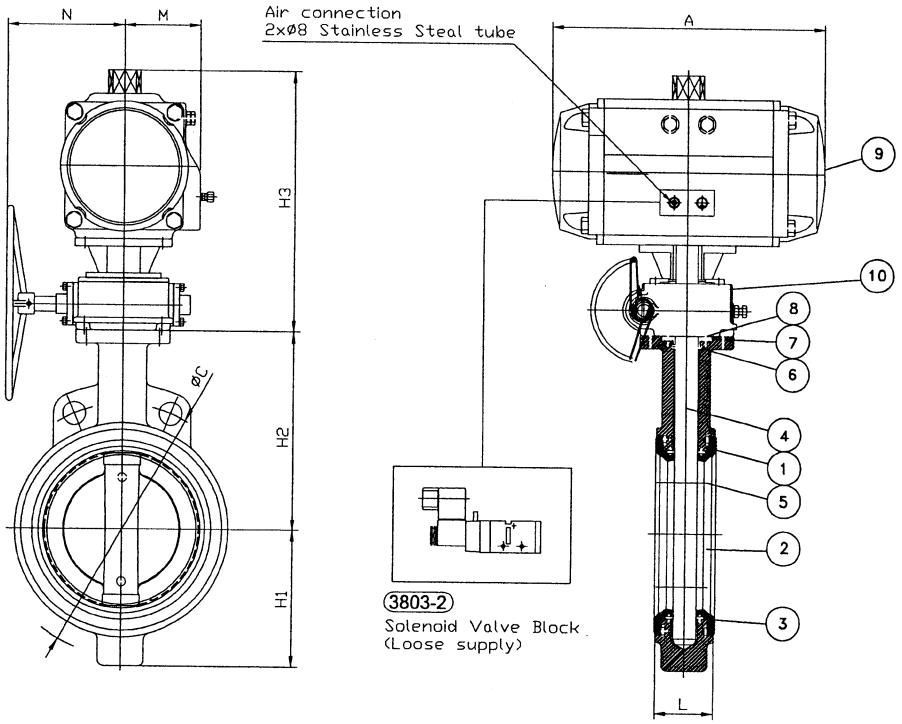
SAMGONG VOS

DESCRIPTION :

TEST PORT VALVE
(JIS 10K-25A)

DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho

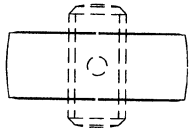
SCALE	DWG. NO.	REV.
NONE	P001201	△



P.NO.	PART NAME	MATERIAL	Q'TY	REMARK
1	BODY	DUCTILE IRON	1	FCD450
2	DISC	ST.ST.	1	SCS14
3	SEAT	RUBBER	1	NBR
4	STEM	ST.ST.	1	SUS410
5	DISC PIN	ST.ST.	1set	SUS304
6	O-RING	RUBBER	2	NBR
7	GLAND BUSH	STEEL(G)	1	
8	GLAND BOLT	ST.ST.	1set	
9	ACTUATOR	ASS'Y	1	
10	DECLUTCH GEAR	ASS'Y	1	

ACTUATOR POSITION

P1



P3

TAG NO.
2102

NOTES

1. HYDROSTATIC TEST

Check	Description		HYD. TEST PRESS	Working pressure
□	BODY		Working pressure x 1.5time	
	SEAT		Working pressure x 1.1time	
■	JIS 5K	BODY	7.5 Kg/cm²	
		SEAT	5.5 Kg/cm²	

2. BODY MARKING

ACE
5K
SIZE
MATERIAL

3. FLANGE FINISH : ■ N/A
4. ACTUATOR POSITION : P1
5. IN CASE OF ACTUATOR DIMENSION,
SEE FINAL PAGES FOR EACH ACTUATOR MODEL.

DIMENSIONS Unit : mm

NOMINAL DIAMETER	L	⌀C	REFERENCE (APPROX.)								Weight Approx. (Kg)
			H1	H2	H3	A	B	M	N	ACT MODEL	
80(3")	46	145	75	150	258	144	70	42	200	HP-50DA/HP63S-10S	12.9

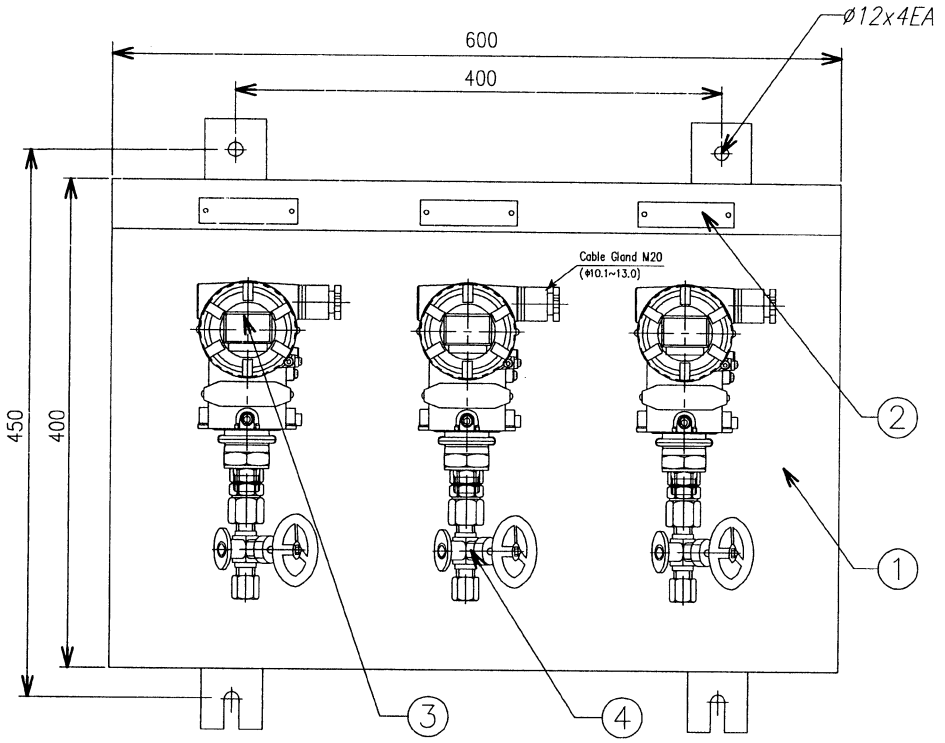
SAMGONG VOS

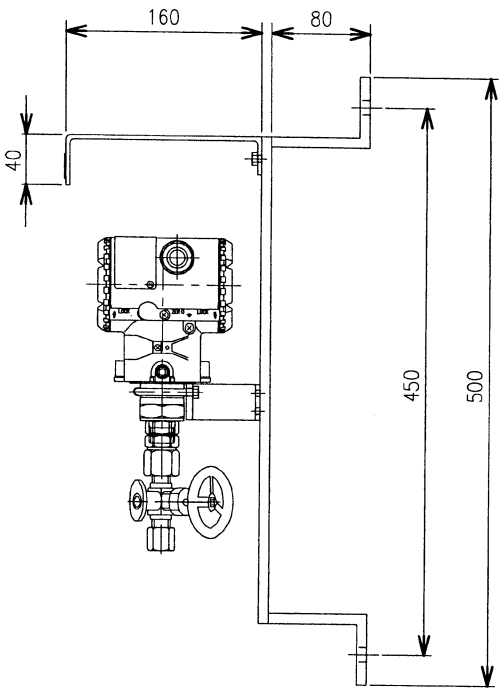
DESCRIPTION :
A.P VENTURI GAS SUPPLY VALVE

DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho

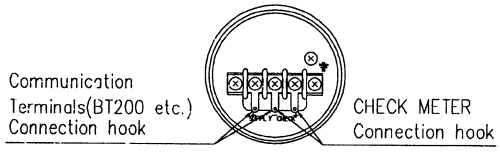
SCALE	DWG. NO.	REV.
NONE	SV6PD036	△

CONTROL NO. : SH0501V - 103 / 119





* Terminal Configuration



* Terminal Wiring

SUPPLY + −	Power supply and output terminal
CHECK + −	External indicator(ammeter) terminal
⏚	Ground terminal

NOTE

1. Maker : YOKOGAWA
2. Type : EJA510A (Absolute P.T)
3. Working Range : 0 to 3.5 kg/cm²

TAG NO.
2103-1
2103-2
2103-3

4	3-WAY TEST COCK	SUS316L	3	NPT1/2"xø10
3	PRESS. TRANSMITTER	SUS316L	3	
2	NAME PLATE	SUS316	3	80x20x1t
1	BOARD	SS400	1	600x400x8t

SAMGONG VOS

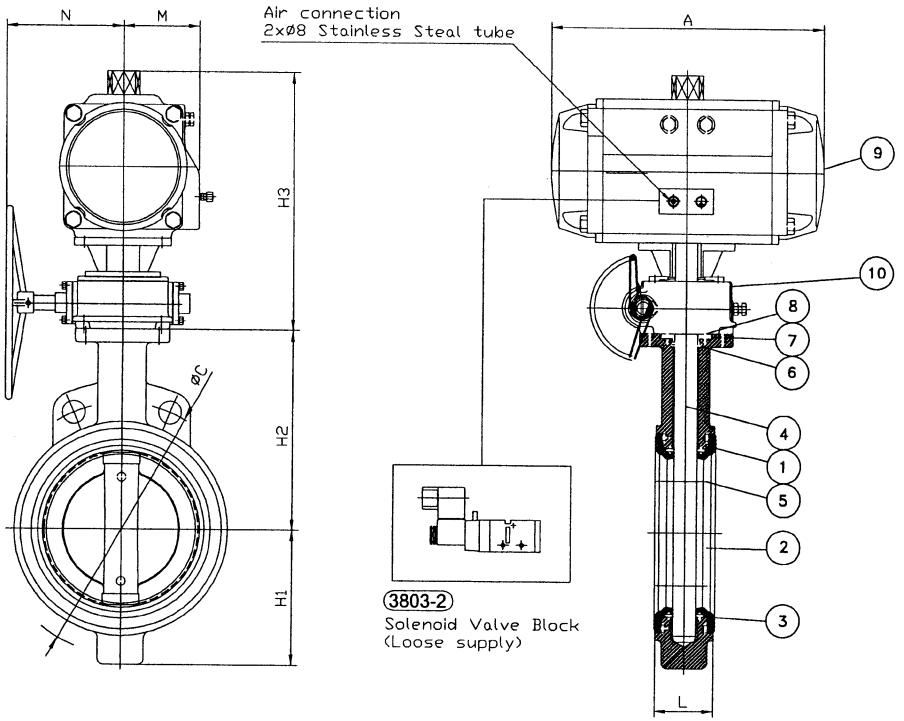
DESCRIPTION :

VENTURI PRESSURE TRANSMITTER (A.P.TANK LINE)

DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho

SCALE	DWG. NO.	REV.
NONE	SVPD037	△

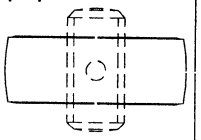
CONTROL NO. : SH0501V - 104 / 119



P.NO.	PART NAME	MATERIAL	Q'TY	REMARK
1	BODY	DUCTILE IRON	1	FCD450
2	DISC	ST.ST.	1	SCS14
3	SEAT	RUBBER	1	NBR
4	STEM	ST.ST.	1	SUS410
5	DISC PIN	ST.ST.	1set	SUS304
6	O-RING	RUBBER	2	NBR
7	GLAND BUSH	STEEL(G)	1	
8	GLAND BOLT	ST.ST.	1set	
9	ACTUATOR	ASS'Y	1	
10	DECLUTCH GEAR	ASS'Y	1	

ACTUATOR POSITION

P1



P3

TAG NO.

2104

NOTES

1. HYDROSTATIC TEST

Check	Description		HYD. TEST PRESS	Working pressure
□	BODY		Working pressure x 1.5time	
	SEAT		Working pressure x 1.1time	
■	JIS 5K	BODY	7.5 Kg/cm²	
		SEAT	5.5 Kg/cm²	

2. BODY MARKING

ACE
5K
SIZE
MATERIAL

3. FLANGE FINISH : ■ N/A
4. ACTUATOR POSITION : P1
5. IN CASE OF ACTUATOR DIMENSION, SEE FINAL PAGES FOR EACH ACTUATOR MODEL.

DIMENSIONS Unit : mm

NOMINAL DIAMETER	L	⌀C	REFERENCE (APPROX.)								Weight Approx. (Kg)
			H1	H2	H3	A	B	M	N	ACT MODEL	
50(2")	43	105	55	128	258	144	-	42	200	HP-50DA/HP63S-10S	10.9

SAMGONG VOS

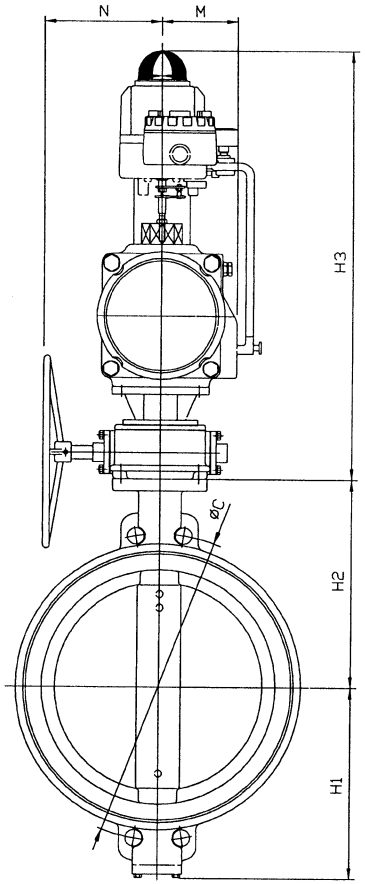
DESCRIPTION :

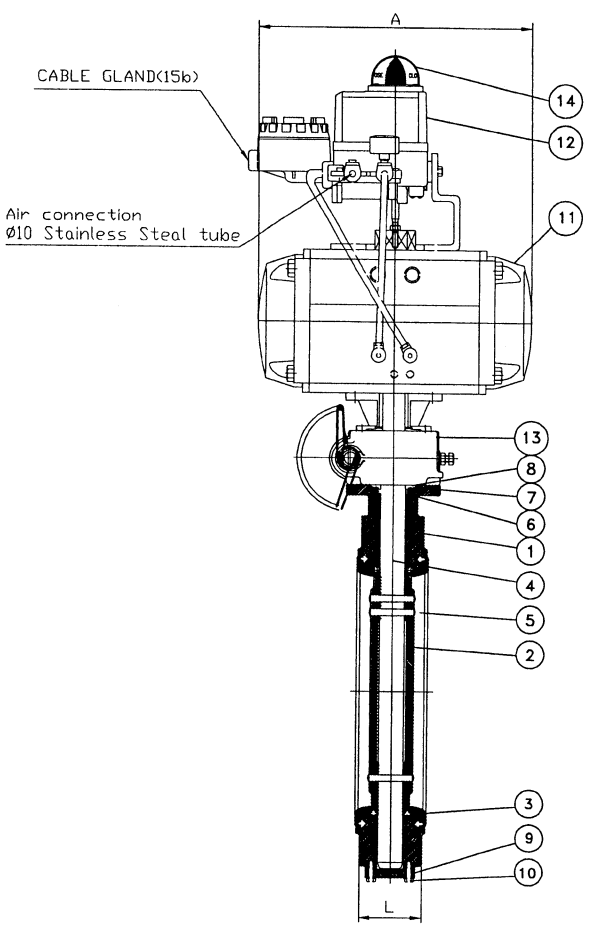
A.P VENTURI REAERATION VALVE

DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho

SCALE	DWG. NO.	REV.
NONE	SV6PD038	△

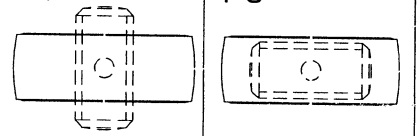
CONTROL NO. : SH0501V - 105 / 119





P.NO.	PART NAME	MATERIAL	Q'TY	REMARK
1	BODY	DUCTILE IRON	1	FCD450
2	DISC	ST.ST.	1	SCS14
3	SEAT	RUBBER	1	NBR
4	STEM	ST.ST.	1	SUS410
5	DISC PIN	ST.ST.	1set	SUS304
6	O-RING	RUBBER	2	NBR
7	GLAND BUSH	STEEL(G)	1	
8	GLAND BOLT	ST.ST.	1set	
9	BOTTOM COVER	STEEL	1	
10	BOTTOM BOLT	STEEL(G)	1set	
11	ACTUATOR	ASS'Y	1	
12	POSITIONER	ASS'Y	1	RA TYPE
13	DECLUTCH GEAR	ASS'Y	1	
14	LIMIT SWITCH	ASS'Y	1	

ACTUATOR POSITION



TAG NO.
2105

NOTES

1. HYDROSTATIC TEST

Check	Description		HYD. TEST PRESS	Working pressure
□	BODY		Working pressure x 1.5time	
	SEAT		Working pressure x 1.1time	
■	JIS 5K	BODY	7.5 Kg/cm²	
		SEAT	5.5 Kg/cm²	

2. BODY MARKING

ACE
5K
SIZE
MATERIAL

3. FLANGE FINISH : ■ N/A
4. ACTUATOR POSITION : P1
5. IN CASE OF ACTUATOR DIMENSION, SEE FINAL PAGES FOR EACH ACTUATOR MODEL.

DIMENSIONS Unit : mm

NOMINAL DIAMETER	L	øC	REFERENCE (APPROX.)							Weight Approx. (Kg)
			H1	H2	H3	A	M	N	ACT MODEL	
200(8")	60	280	155	230	401	247	59	200	HP-88DA	24.5

SAMGONG VOS

DESCRIPTION :

A.P. VENTURI SUPPLY WATER PRESSURE CONTROL VALVE

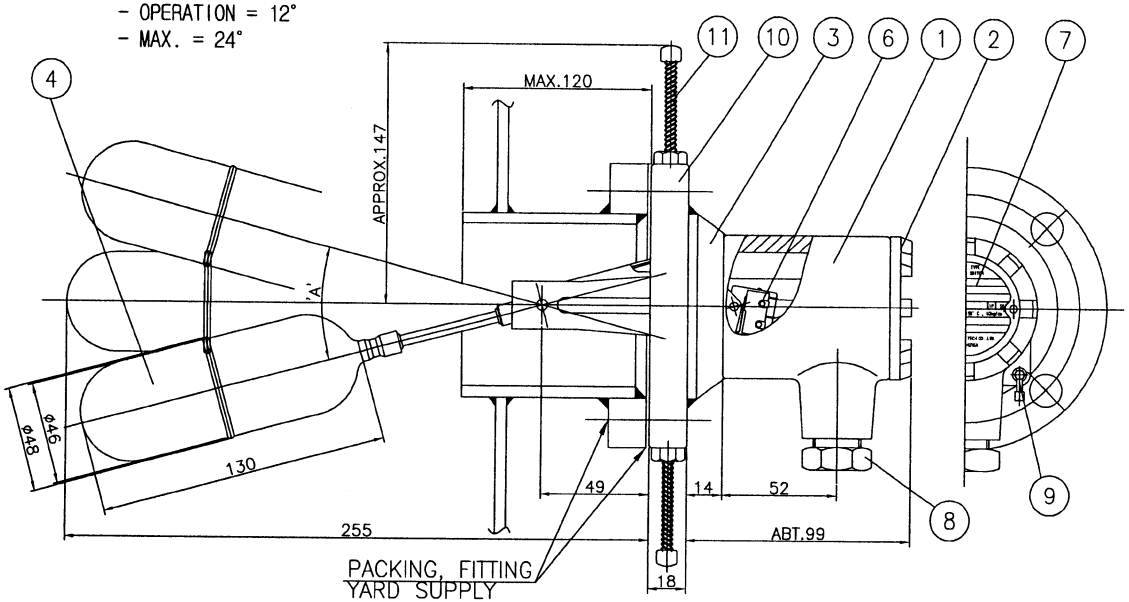
DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho

SCALE	DWG. NO.	REV.
NONE	SV6PD039	△

CONTROL NO. : SH0501V - 106 / 119

■ ANGLE 'A'
- OPERATION = 12°
- MAX. = 24°

FOR HIGH LEVEL



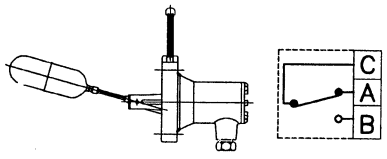
FOR LOW LEVEL

TAG NO.
2012
2013
2014
2106

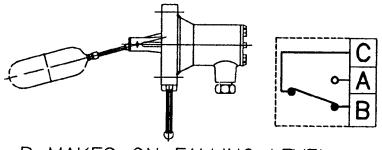
■ TECHNICAL DATA ■

1. INSTALLATION : SIDE MOUNTING
2. MAX.WORKING PRESS. : 10㎏/cm
3. MAX.WORKING TEMP. : 150°C
4. PERMISSIBLE AMB.TEMP. : −10 ~ 60°C
5. PERMISSIBLE SPECIFIC GRAVITY : 0.65 ~1.3
6. SWITCH TYPE : MICRO SWITCH
7. CONTACT FORM : SPDT
8. CONTACT RATING : 5A 125V, 3A 250V AC
9. ENCLOSURE : WEATHER PROOF (IP56)

■ WIRING DIAGRAM ■



C−A MAKES ON RISING LEVEL



C−B MAKES ON FALLING LEVEL

■ FLANGE DIMENSION ■

SIZE	O.D	P.C.D	No of Hole	Hole Size	REMARK
5K 65A	175	140	4	19	

NO.	DESCRIPTION	SIZE	MAT'L	Q'TY	REMARK
1	BODY		AC	1	
2	COVER		AC	1	
3	FLANGE		SS400	1	
4	FLOAT		SUS316	1	
5	MAGNET		ALNICO	1	
6	SWITCH BOX			1	
7	NAME PLATE		BS	1	
8	CABLE GLAND		BS	1	Cr Plated
9	EARTH TERMINAL	1.25sq	AL	1	
10	FLANGE		SS400	1	
11	TEST DEVICE		SUS304/BS	1	

SAMGONG VOS

DESCRIPTION :

LEVEL SWITCH

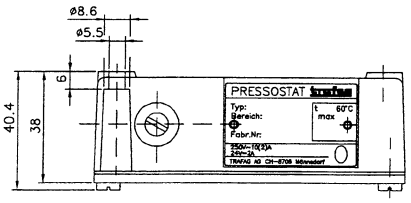
DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho

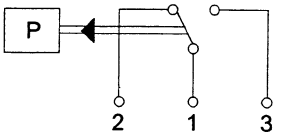
SCALE	DWG. NO.	REV.
NONE	SV6PD040	△

CONTROL NO. : SH0501V − 107 / 119

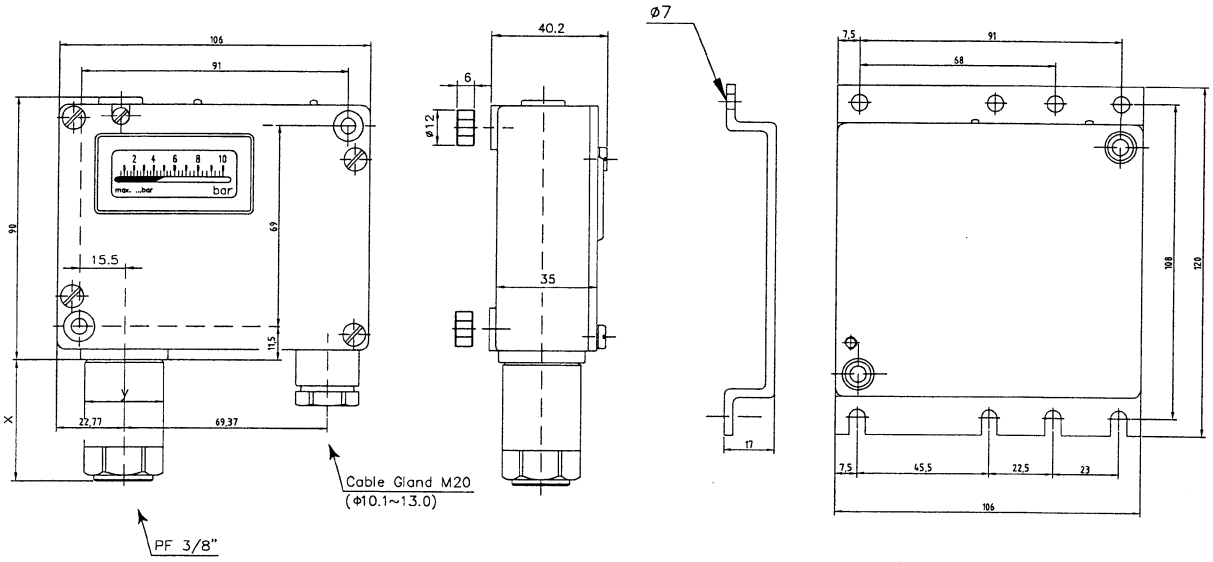
CONTROL NO. : SH0501V – 108 / 100

TAG NO.
3006





Connections



Mounting bracket No.31

(Single stage Controller)

. Robust aluminium die cast housing, epoxy coated
. Accuracy ±2% of full scale
. Rapeatability < ±0.5% of full scale
. Protection IP65
. Any mounting position possible
. Electrical connection to thress point terminal inside housing

(Microswitch ratings)

. Switch type No.11, 23 and 26
- AC 380V ~ 15 (3) A
- DC 220V - 0.2 (0.02) A 110V - 0.4 (0.03) A
24V - 6 (2) A 12V - 15 (8) A

. Switch type No.10
- AC 250V ~ 10 (2) A
- DC 220V - 0.2 (0.01) A 110V - 0.4 (0.02) A
24V - 2.0 (1.0) A 12V - 15 (7) A

(Specifications)

Pressure range in bar	max. working Pressure in bar	max. short time over pressure in bar	Switch type number	Switching differential in bar	Ambient temperature	Media temperature
-0.9 ... 1.5 0.2 ... 1.6 0.2 ... 2.5	10	13	10 12, 23	ca. 0.03 ca. 0.06	-20 ... +70°C	-40 ... +150°C
0 ... 4 0 ... 6	12	26	10 12, 23	ca. 0.08 ca. 0.2		
1 ... 10 1 ... 16	24	36	10 12, 23	ca. 0.2 ca. 0.4		
2 ... 25 4 ... 40	40	75	10 12, 23	ca. 0.5 ca. 1.0		

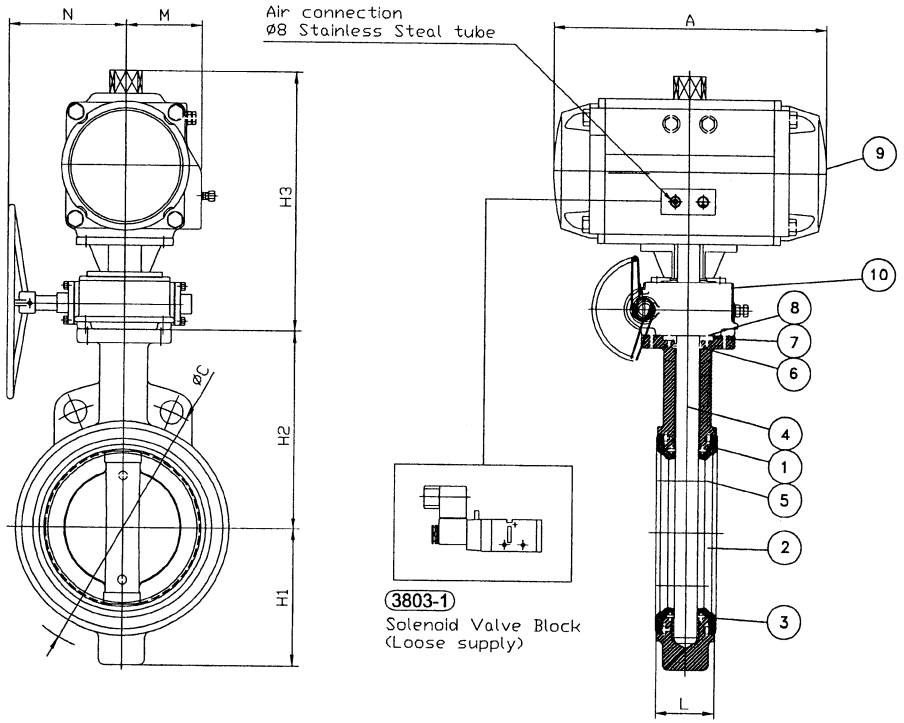
SAMGONG VOS

DESCRIPTION :

PRESSURE SWITCH
(type : 900)

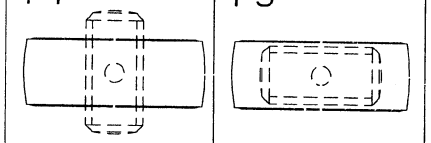
DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho

SCALE	DWG. NO.	REV.
NONE	SV6PD041	△



P.NO.	PART NAME	MATERIAL	Q'TY	REMARK
1	BODY	DUCTILE IRON	1	FCD450
2	DISC	ST.ST.	1	SCS14
3	SEAT	RUBBER	1	NBR
4	STEM	ST.ST.	1	SUS410
5	DISC PIN	ST.ST.	1set	SUS304
6	O-RING	RUBBER	2	NBR
7	GLAND BUSH	STEEL(G)	1	
8	GLAND BOLT	ST.ST.	1set	
9	ACTUATOR	ASS'Y	1	
10	DECLUTCH GEAR	ASS'Y	1	

ACTUATOR POSITION



TAG NO.
3101

NOTES

1. HYDROSTATIC TEST

Check	Description		HYD. TEST PRESS	Working pressure
□	BODY		Working pressure x 1.5time	
	SEAT		Working pressure x 1.1time	
■	JIS 5K	BODY	7.5 Kg/cm²	
		SEAT	5.5 Kg/cm²	

2. BODY MARKING

ACE
5K
SIZE
MATERIAL

3. FLANGE FINISH : ■ N/A
4. ACTUATOR POSITION : P1
5. SINGLE ACTING ACTUATOR
   - NORMAL POSITION OPEN
6. IN CASE OF ACTUATOR DIMENSION,
   SEE FINAL PAGES FOR EACH ACTUATOR MODEL.

DIMENSIONS Unit : mm

NOMINAL DIAMETER	L	øC	REFERENCE (APPROX.)								Weight Approx. (Kg)
			H1	H2	H3	A	B	M	N	ACT MODEL	
80(3")	46	145	75	150	258	144	70	42	200	HP-50DA/HP63S-10S	12.9

SAMGONG VOS

DESCRIPTION :

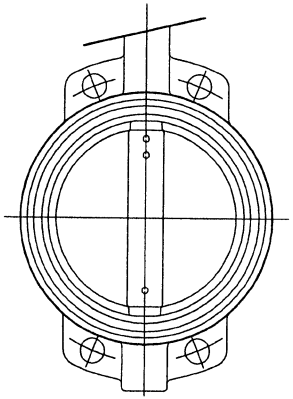
DECK SEAL VENT VALVE

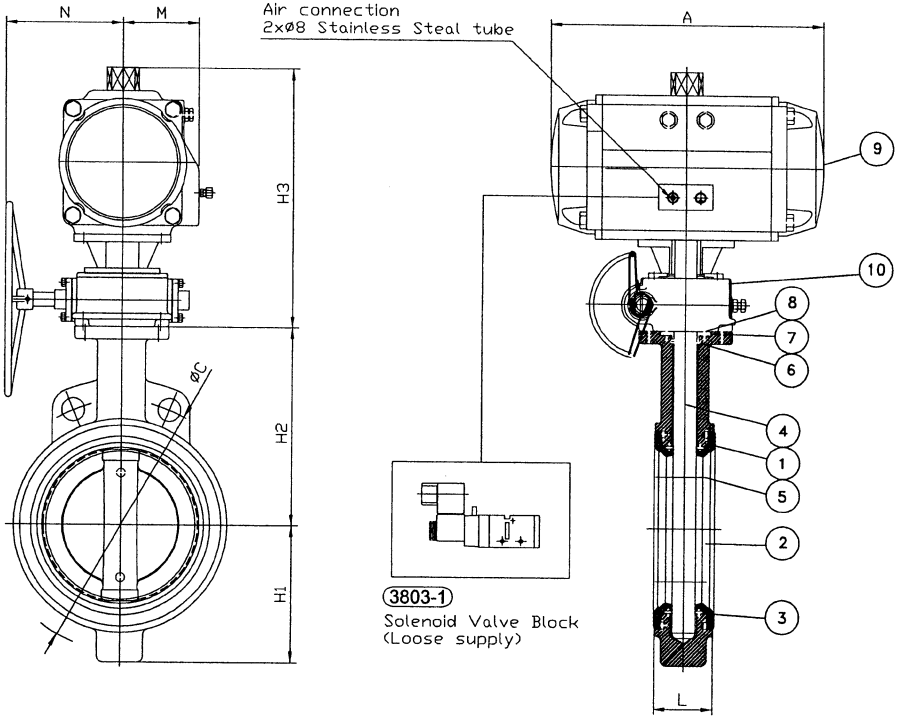
DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho

SCALE	DWG. NO.	REV.
NONE	SV6PD042	△

CONTROL NO. : SH0501V - 109 / 119

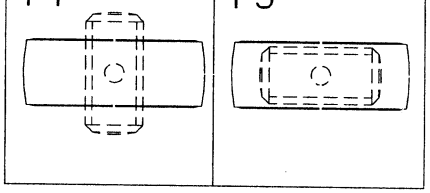
ND 250(10") & OVER





P.NO.	PART NAME	MATERIAL	Q'TY	REMARK
1	BODY	DUCTILE IRON	1	FCD450
2	DISC	ST.ST.	1	SCS14
3	SEAT	RUBBER	1	NBR
4	STEM	ST.ST.	1	SUS410
5	DISC PIN	ST.ST.	1set	SUS304
6	O-RING	RUBBER	2	NBR
7	GLAND BUSH	STEEL(G)	1	
8	GLAND BOLT	ST.ST.	1set	
9	ACTUATOR	ASS'Y	1	
10	DECLUTCH GEAR	ASS'Y	1	

ACTUATOR POSITION



TAG NO.
3102

NOTES

1. HYDROSTATIC TEST

Check	Description		HYD. TEST PRESS	Working pressure
□	BODY		Working pressure x 1.5time	
	SEAT		Working pressure x 1.1time	
■	JIS 5K	BODY	7.5 Kg/cm²	
		SEAT	5.5 Kg/cm²	

2. BODY MARKING

ACE
5K
SIZE
MATERIAL

3. FLANGE FINISH : ■ N/A
4. ACTUATOR POSITION : P1
5. IN CASE OF ACTUATOR DIMENSION, SEE FINAL PAGES FOR EACH ACTUATOR MODEL.

DIMENSIONS Unit : mm

NOMINAL DIAMETER	L	øC	REFERENCE (APPROX.)								Weight Approx. (Kg)
			H1	H2	H3	A	B	M	N	ACT MODEL	
400(16")	102	495	325	370	391	467	70	101	200	HP-160DA	103.0

SAMGONG VOS

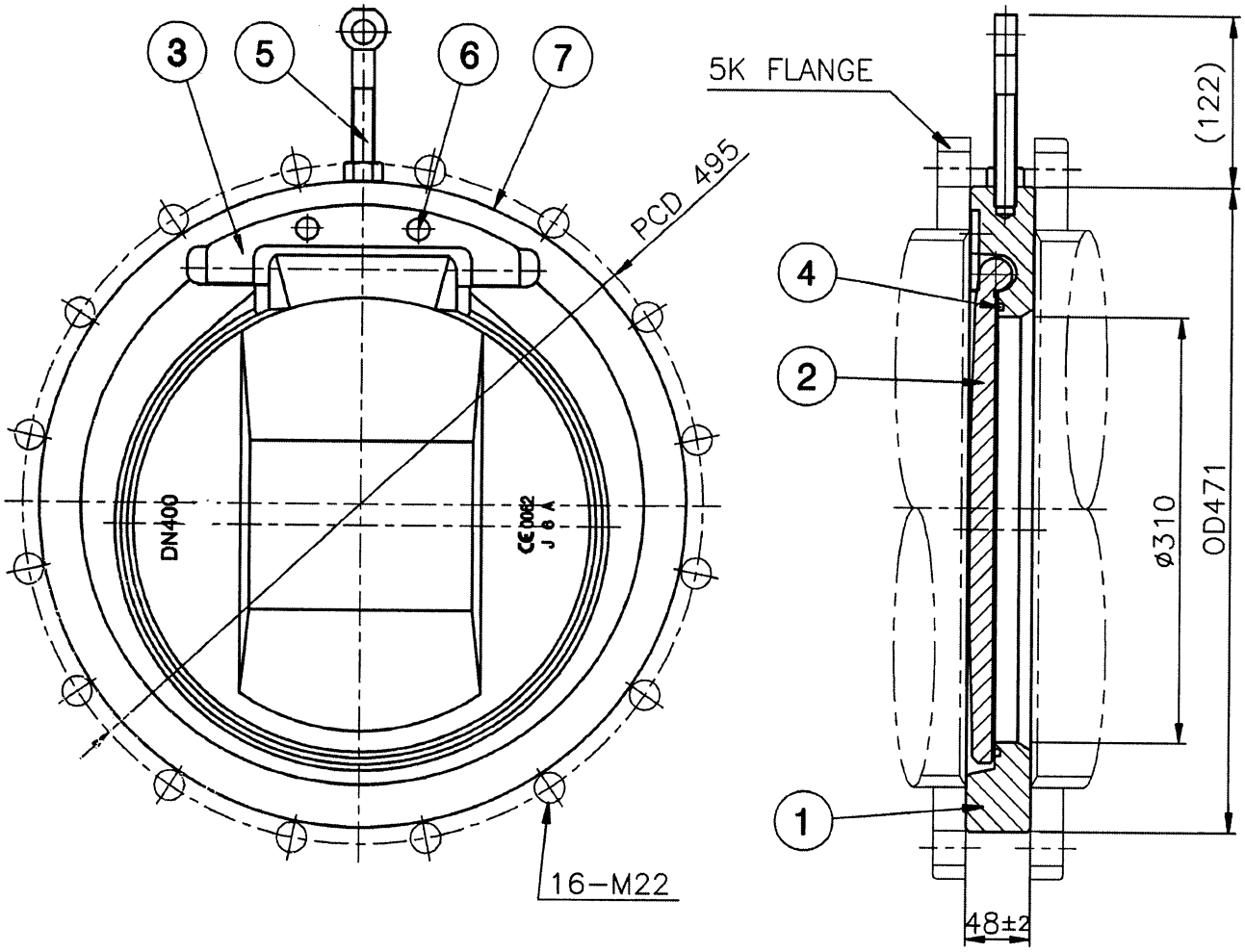
DESCRIPTION :

BALLAST TANK
GAS DELIVERY VALVE

DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	V.S.Shon	Y.M.Cho

SCALE	DWG. NO.	REV.
NONE	SV6PD044	△

CONTROL NO. : SH0501V - 110 / 119



No.	NAME	MATERIAL	Q'TY
1	BODY	A351 CF8M	1
2	DISC	A351 CF8M	1
3	DISC COVER	A240 S31603	1
4	SEAT O-RING	NBR	1
5	UPPER BOLT	G4317 SUS304	1
6	COVER BOLT	G4317 SUS316	2
7	NAME PLATE	A240 S30400	1

NOTE

1. Flange Connection : JIS 5K-400A
2. Weight : 54.6 Kg
3. Material : Standard ASTM
4. Test Pressure (WATER)

PRESSURE	TIME	LEAKAGE RATES
Shell Test(8kgf/cm²)	120sec	No Leak
Shell Test(6kgf/cm²)	120sec	No Leak

(This Test Pressure depend to Standard API 598)

5. The tolerance of FTF dimension : EN558-1
6. Working Pressure : 0.013 kgf/cm²

TAG NO.
3104

CONTROL NO. : SH0501V - 111 / 119

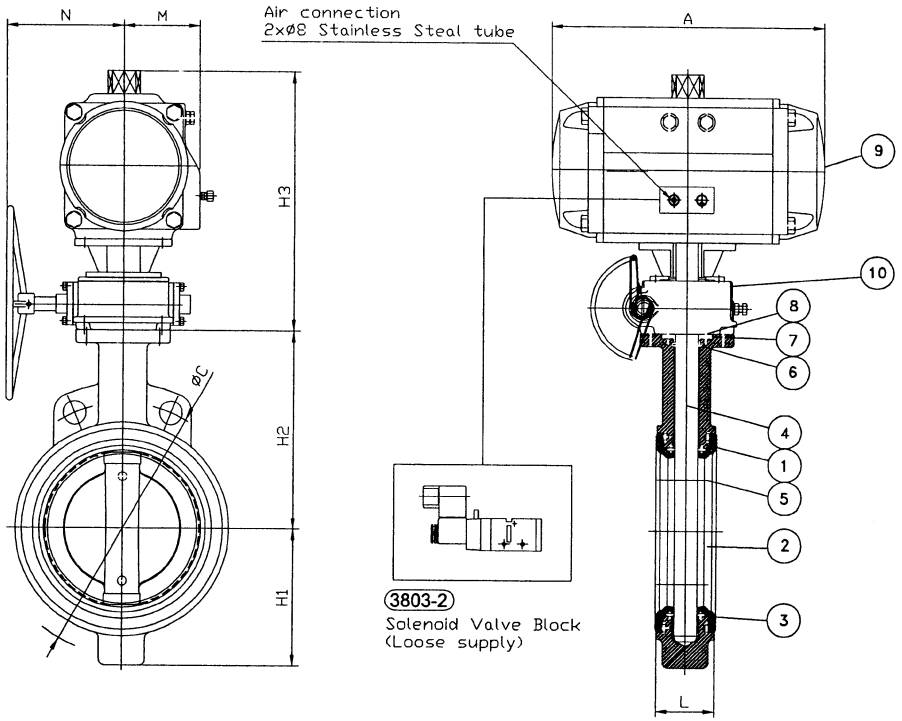
SAMGONG VOS

DESCRIPTION :

BALLAST TANK GAS DELIVERY
NON-RETURN VALVE

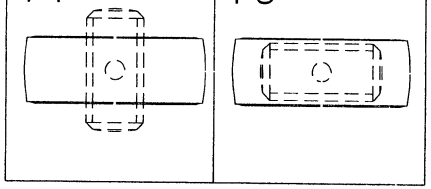
DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho

SCALE	DWG. NO.	REV.
NONE	SV6PD113A	△



P.NO.	PART NAME	MATERIAL	Q'TY	REMARK
1	BODY	DUCTILE IRON	1	FCD450
2	DISC	ST.ST.	1	SCS14
3	SEAT	RUBBER	1	NBR
4	STEM	ST.ST.	1	SUS410
5	DISC PIN	ST.ST.	1set	SUS304
6	O-RING	RUBBER	2	NBR
7	GLAND BUSH	STEEL(G)	1	
8	GLAND BOLT	ST.ST.	1set	
9	ACTUATOR	ASS'Y	1	
10	DECLUTCH GEAR	ASS'Y	1	

ACTUATOR POSITION



TAG NO.
3105

NOTES

1. HYDROSTATIC TEST

Check	Description		HYD. TEST PRESS	Working pressure
□	BODY		Working pressure × 1.5time	
	SEAT		Working pressure × 1.1time	
■	JIS 5K	BODY	7.5 Kg/cm²	
		SEAT	5.5 Kg/cm²	

2. BODY MARKING

ACE
5K
SIZE
MATERIAL

3. FLANGE FINISH : ■ N/A
4. ACTUATOR POSITION : P1
5. IN CASE OF ACTUATOR DIMENSION, SEE FINAL PAGES FOR EACH ACTUATOR MODEL.

DIMENSIONS Unit : mm

NOMINAL DIAMETER	L	øC	REFERENCE (APPROX.)								Weight Approx. (Kg)
			H1	H2	H3	A	B	M	N	ACT MODEL	
100(4")	52	165	95	165	258	144	70	42	200	HP-50DA	14.5

SAMGONG VOS

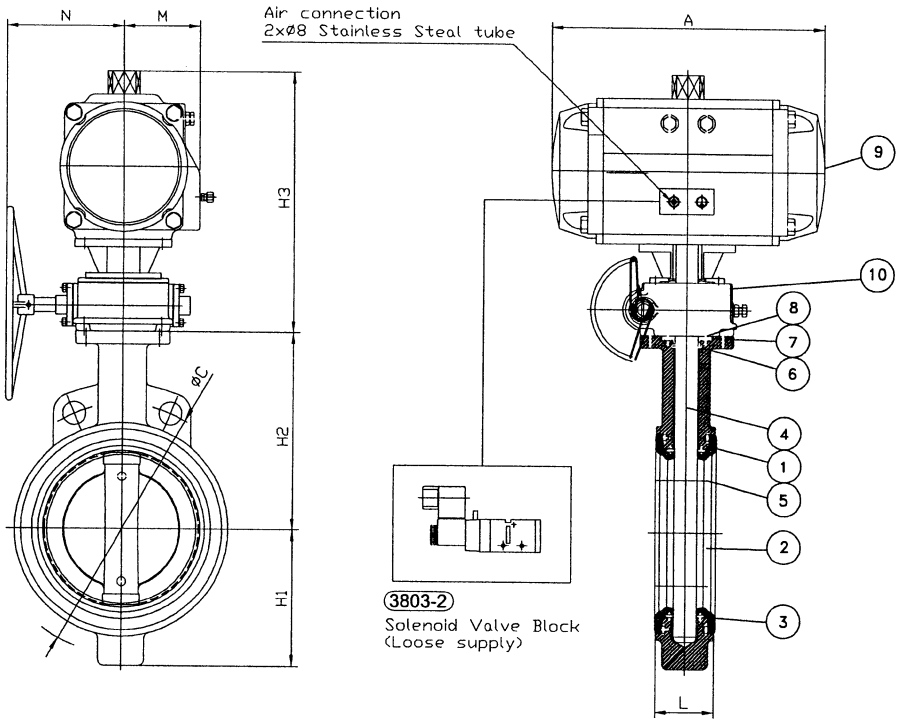
DESCRIPTION :

A.P.TANK GAS DELIVERY VALVE

DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho

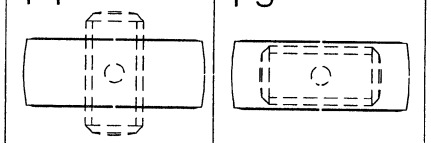
SCALE	DWG. NO.	REV.
NONE	SV6PD044A	△

CONTROL NO. : SH0501V -111A / 119



P.NO.	PART NAME	MATERIAL	Q'TY	REMARK
1	BODY	DUCTILE IRON	1	FCD450
2	DISC	ST.ST.	1	SCS14
3	SEAT	RUBBER	1	NBR
4	STEM	ST.ST.	1	SUS410
5	DISC PIN	ST.ST.	1set	SUS304
6	O-RING	RUBBER	2	NBR
7	GLAND BUSH	STEEL(G)	1	
8	GLAND BOLT	ST.ST.	1set	
9	ACTUATOR	ASS'Y	1	
10	DECLUTCH GEAR	ASS'Y	1	

ACTUATOR POSITION



TAG NO.
3107

NOTES

1. HYDROSTATIC TEST

Check	Description		HYD. TEST PRESS	Working pressure
□	BODY		Working pressure x 1.5time	
	SEAT		Working pressure x 1.1time	
■	JIS 5K	BODY	7.5 Kg/cm²	
		SEAT	5.5 Kg/cm²	

2. BODY MARKING

ACE
5K
SIZE
MATERIAL

3. FLANGE FINISH : ■ N/A
4. ACTUATOR POSITION : P1
5. IN CASE OF ACTUATOR DIMENSION,
   SEE FINAL PAGES FOR EACH ACTUATOR MODEL.

DIMENSIONS Unit : mm

NOMINAL DIAMETER	L	⌀C	REFERENCE (APPROX.)								Weight Approx. (Kg)
			H1	H2	H3	A	B	M	N	ACT MODEL	
200(8")	60	280	155	230	300	247	–	59	200	HP-88DA	23.0

SAMGONG VOS

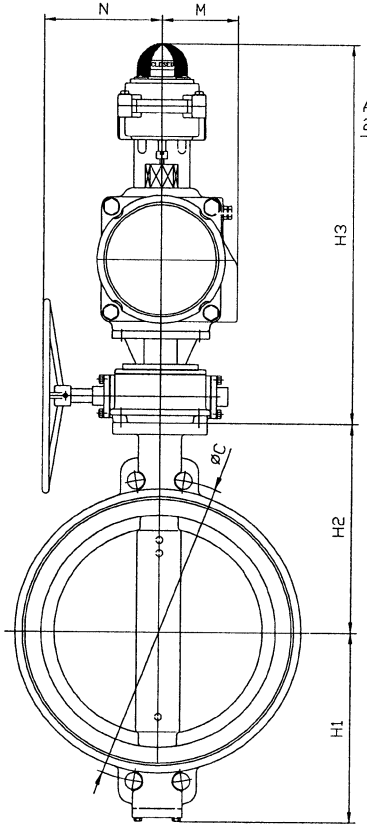
DESCRIPTION :

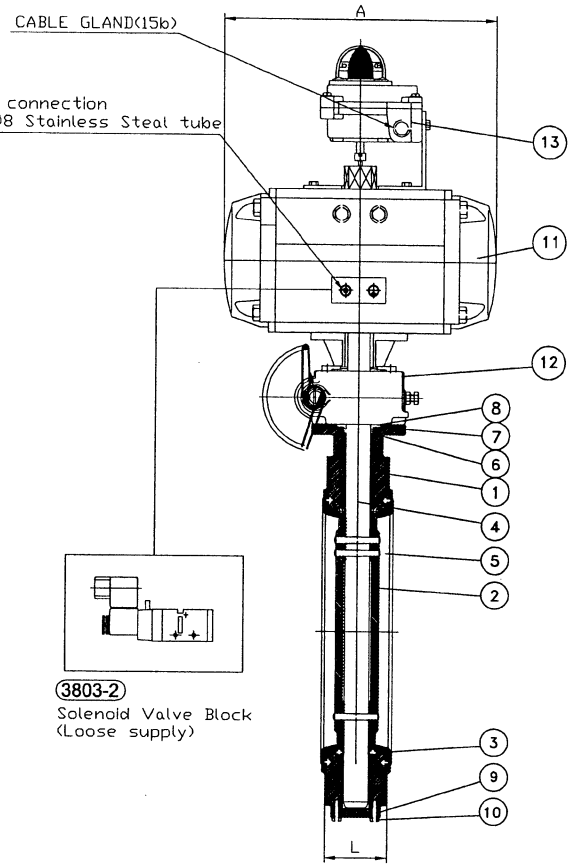
VENTURI TO A.P.TANK VALVE

DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho

SCALE	DWG. NO.	REV.
NONE	SV6PD045	△

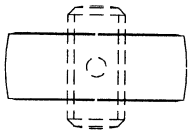
CONTROL NO. : SH0501V – 112 / 119

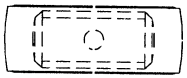




P.NO.	PART NAME	MATERIAL	Q'TY	REMARK
1	BODY	DUCTILE IRON	1	FCD450
2	DISC	ST.ST.	1	SCS14
3	SEAT	RUBBER	1	NBR
4	STEM	ST.ST.	1	SUS410
5	DISC PIN	ST.ST.	1set	SUS304
6	O-RING	RUBBER	2	NBR
7	GLAND BUSH	STEEL(G)	1	
8	GLAND BOLT	ST.ST.	1set	
9	BOTTOM COVER	STEEL	1	
10	BOTTOM BOLT	STEEL(G)	1set	
11	ACTUATOR	ASS'Y	1	
12	DECLUTCH GEAR	ASS'Y	1	
13	LIMIT SWITCH BOX	ASS'Y	1	

ACTUATOR POSITION	
P1	P3





TAG NO.
3108

NOTES

1. HYDROSTATIC TEST

Check	Description		HYD. TEST PRESS	Working pressure
□	BODY		Working pressure x 1.5time	
	SEAT		Working pressure x 1.1time	
■	JIS 5K	BODY	7.5 Kg/cm²	
		SEAT	5.5 Kg/cm²	

2. BODY MARKING

ACE
5K
SIZE
MATERIAL

3. FLANGE FINISH : ■ N/A
4. ACTUATOR POSITION : P1
5. IN CASE OF ACTUATOR DIMENSION, SEE FINAL PAGES FOR EACH ACTUATOR MODEL.

DIMENSIONS — Unit : mm

NOMINAL DIAMETER	L	øC	REFERENCE (APPROX.)								Weight Approx. (Kg)
			H1	H2	H3	A	B	M	N	ACT MODEL	
200(8")	60	280	155	230	450	247	–	59	200	HP-88DA	24.5

SAMGONG VOS

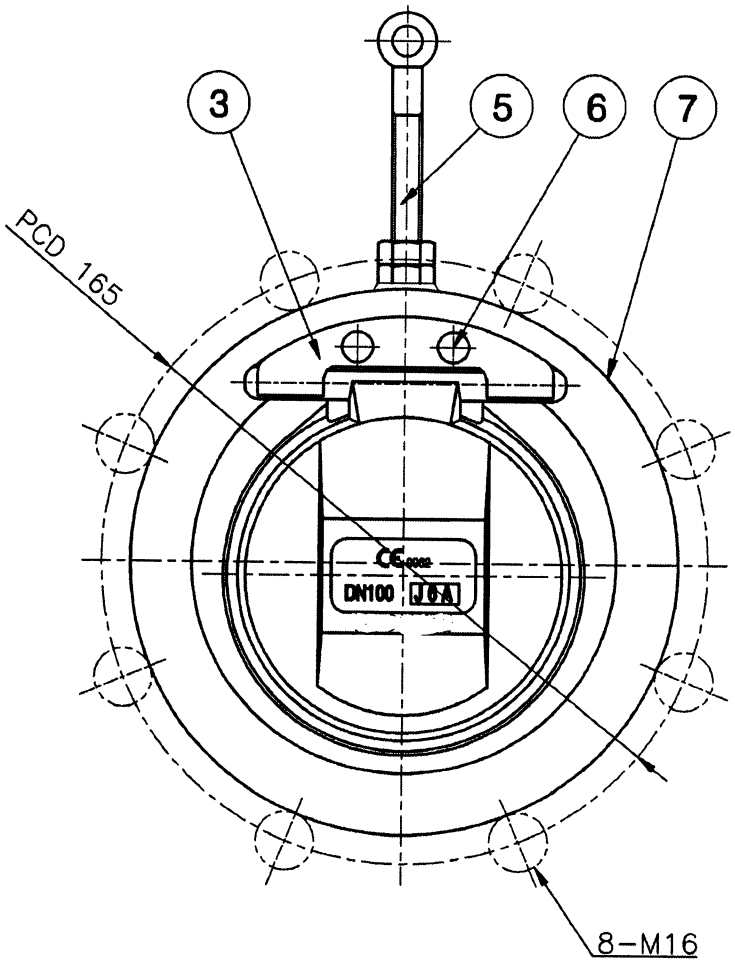
DESCRIPTION :

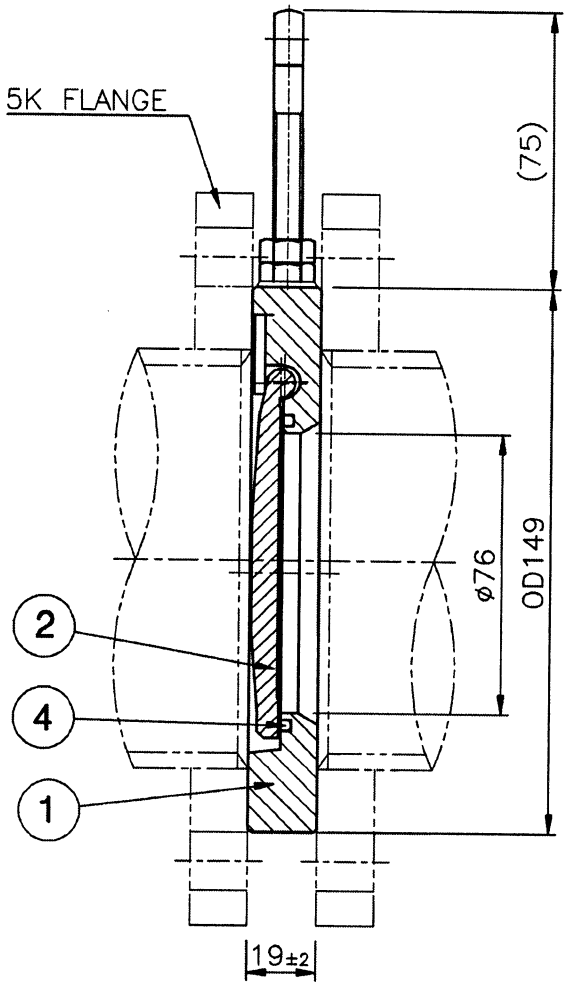
VENTURI TO OVERBOARD VALVE

DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	V.S.Shon	Y.M.Cho

SCALE	DWG. NO.	REV.
NONE	SV6PD046	△

CONTROL NO. : SH0501V – 113 / 119





No.	NAME	MATERIAL	Q'TY
1	BODY	A351 CF8M	1
2	DISC	A351 CF8M	1
3	DISC COVER	A240 S31603	1
4	SEAT O-RING	NBR	1
5	UPPER BOLT	G4317 SUS304	1
6	COVER BOLT	G4317 SUS316	2
7	NAME PLATE	A240 S30400	1

NOTE

1. Flange Connection : JIS 5K-100A
2. Weight : 2.1 Kg
3. Material : Standard ASTM
4. Test Pressure (WATER)

PRESSURE	TIME	LEAKAGE RATES
Shell Test(8kgf/cm²)	60sec	No Leak
Shell Test(6kgf/cm²)	60sec	No Leak

(This Test Pressure depend to Standard API 598)

5. The tolerance of FTF dimension : EN558-1
6. Working Pressure : 0.006 kgf/cm²

TAG NO.
3109-1
3109-2

CONTROL NO. : SH0501V - 113A / 119

SAMGONG VOS

DESCRIPTION :

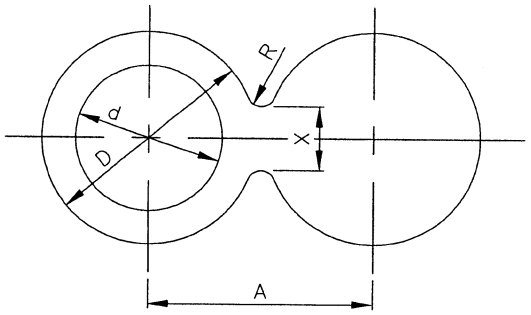
A.P.TANK GAS DELIVERY
NON-RETURN VALVE

DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho

SCALE	DWG. NO.	REV.
NONE	SV6PD044	△

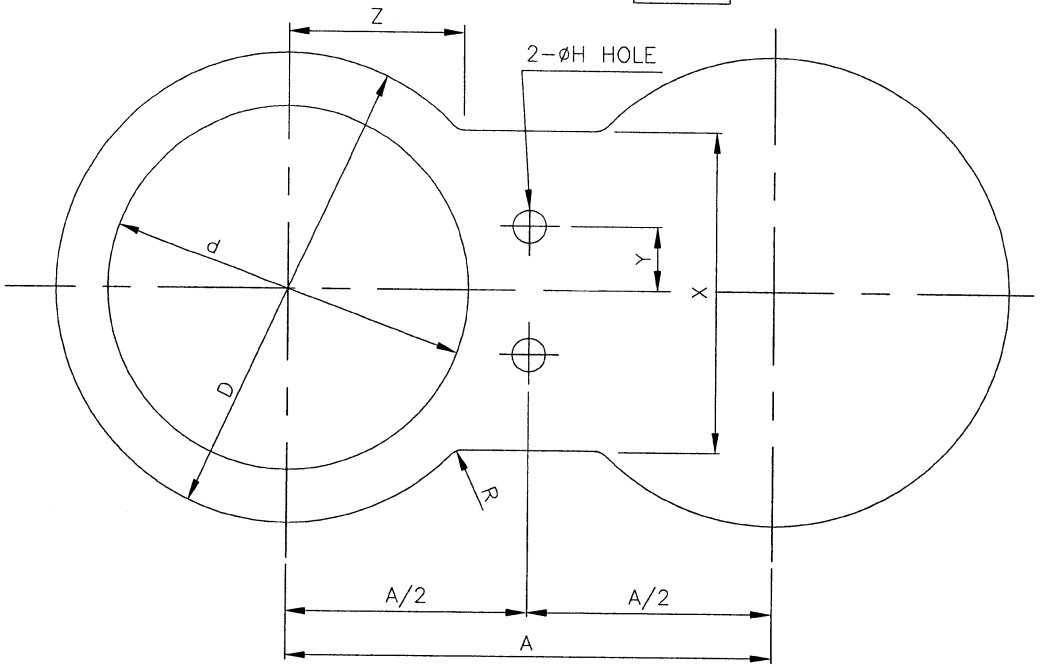
A–TYPE

TAG NO.
3302



B–TYPE

TAG NO.
3301



	FLANGE RATING	NOM. DIA.(A)	FLANGE TYPE	DIMENSION [mm]									MAT'L	Q'TY
				A	d	D	R	H	THK.	X	Y	Z		
For A.P.Tank Line ☞	5K	100	A	152.4	100	146	9.5	–	10	44.1	–	–	SUS316L	1
For Main Ballast Line ☞	5K	250	B	333.2	250	322	11.5	23	12	221	44.6	122	SUS316L	11

SAMGONG VOS

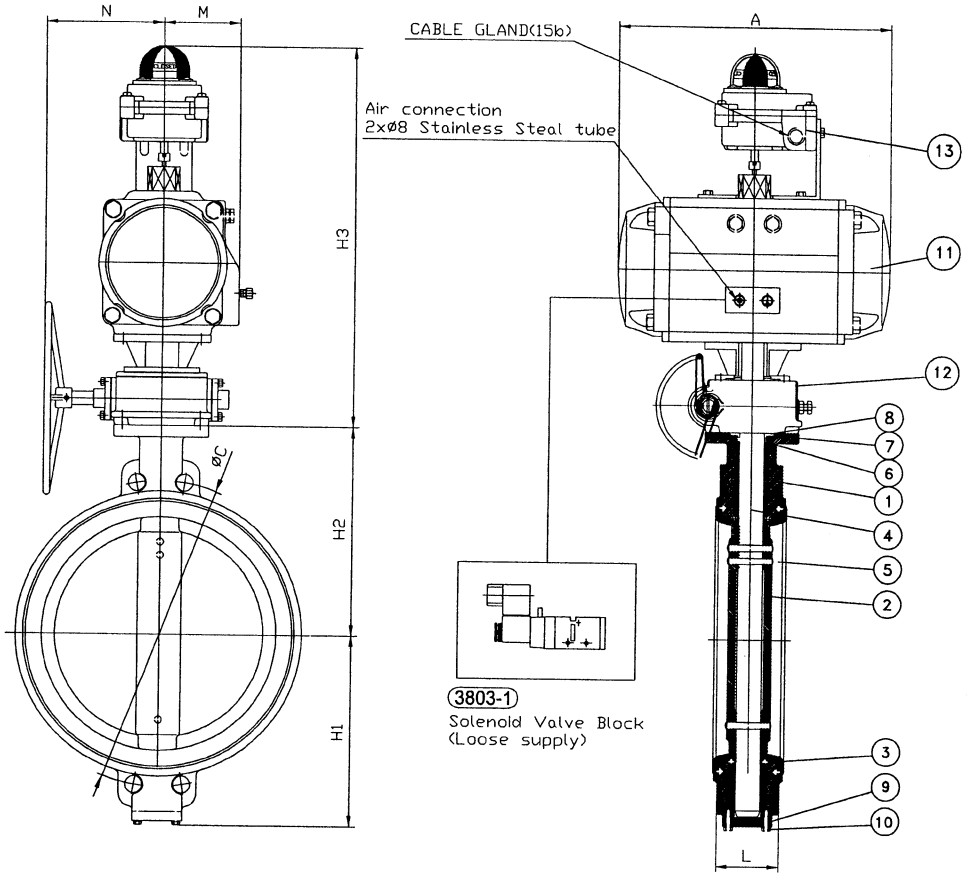
DESCRIPTION :

SPECTACLE FLANGE

DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho

SCALE	DWG. NO.	REV.
NONE	SV6PD047	△

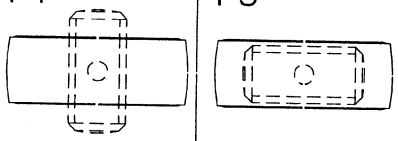
CONTROL NO. : SH0501V – 114 / 119



P.NO.	PART NAME	MATERIAL	Q'TY	REMARK
1	BODY	DUCTILE IRON	1	FCD450
2	DISC	ST.ST.	1	SCS14
3	SEAT	RUBBER	1	NBR
4	STEM	ST.ST.	1	SUS410
5	DISC PIN	ST.ST.	1set	SUS304
6	O-RING	RUBBER	2	NBR
7	GLAND BUSH	STEEL(G)	1	
8	GLAND BOLT	ST.ST.	1set	
9	BOTTOM COVER	STEEL	1	
10	BOTTOM BOLT	STEEL(G)	1set	
11	ACTUATOR	ASS'Y	1	
12	DECLUTCH GEAR	ASS'Y	1	
13	LIMIT SWITCH BOX	ASS'Y	1	

ACTUATOR POSITION

P1 P3



TAG NO.

3501

NOTES

1. HYDROSTATIC TEST

Check	Description		HYD. TEST PRESS	Working pressure
□	BODY		Working pressure x 1.5time	
	SEAT		Working pressure x 1.1time	
■	JIS 5K	BODY	7.5 Kg/cm²	
		SEAT	5.5 Kg/cm²	

2. BODY MARKING

ACE
5K
SIZE
MATERIAL

3. FLANGE FINISH : ■ N/A
4. ACTUATOR POSITION : P1
5. IN CASE OF ACTUATOR DIMENSION, SEE FINAL PAGES FOR EACH ACTUATOR MODEL.

DIMENSIONS Unit : mm

NOMINAL DIAMETER	L	øC	REFERENCE (APPROX.)								Weight Approx. (Kg)
			H1	H2	H3	A	B	M	N	ACT MODEL	
400(16")	102	495	325	370	541	467	-	101	200	HP-160DA	104.5

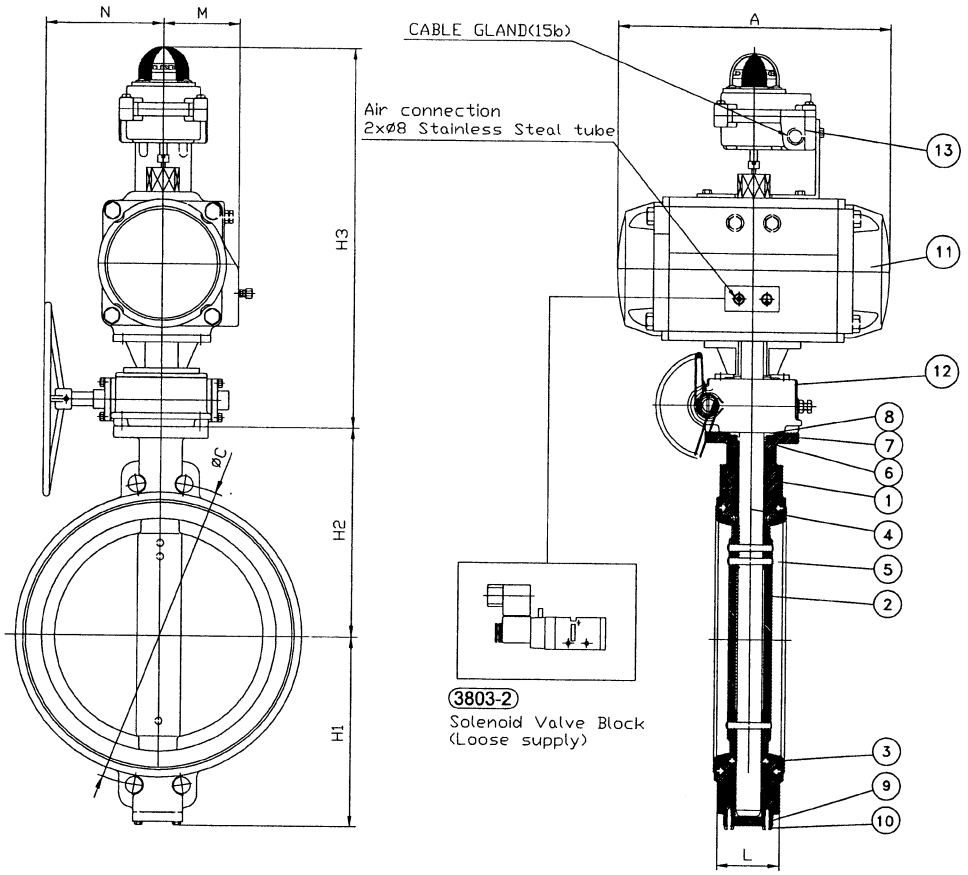
SAMGONG VOS

DESCRIPTION : MAST RISER VALVE

DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	V.S.Shon	Y.M.Cho

SCALE	DWG. NO.	REV.
NONE	SV6PD048	△

CONTROL NO. : SH0501V - 115 / 119



P.NO.	PART NAME	MATERIAL	Q'TY	REMARK
1	BODY	DUCTILE IRON	1	FCD450
2	DISC	ST.ST.	1	SCS14
3	SEAT	RUBBER	1	NBR
4	STEM	ST.ST.	1	SUS410
5	DISC PIN	ST.ST.	1set	SUS304
6	O-RING	RUBBER	2	NBR
7	GLAND BUSH	STEEL(G)	1	
8	GLAND BOLT	ST.ST.	1set	
9	BOTTOM COVER	STEEL	1	
10	BOTTOM BOLT	STEEL(G)	1set	
11	ACTUATOR	ASS'Y	1	
12	DECLUTCH GEAR	ASS'Y	1	
13	LIMIT SWITCH BOX	ASS'Y	1	

ACTUATOR POSITION	
P1	P3

TAG NO.
3502

NOTES

1. HYDROSTATIC TEST

Check	Description		HYD. TEST PRESS	Working pressure
☐	BODY		Working pressure x 1.5time	
	SEAT		Working pressure x 1.1time	
■	JIS 5K	BODY	7.5 Kg/cm²	
		SEAT	5.5 Kg/cm²	

2. BODY MARKING

ACE
5K
SIZE
MATERIAL

3. FLANGE FINISH : ■ N/A
4. ACTUATOR POSITION : P1
5. IN CASE OF ACTUATOR DIMENSION, SEE FINAL PAGES FOR EACH ACTUATOR MODEL.

DIMENSIONS — Unit : mm

NOMINAL DIAMETER	L	øC	REFERENCE (APPROX.)								Weight Approx. (Kg)
			H1	H2	H3	A	B	M	N	ACT MODEL	
100(4")	52	165	95	165	408	144	–	42	200	HP-50DA	16.0

SAMGONG VOS

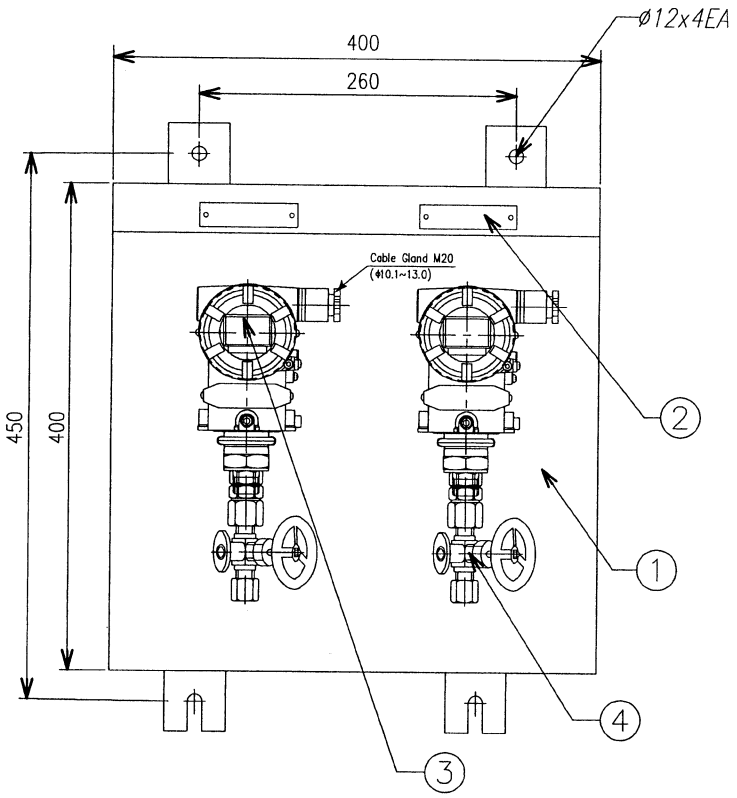
DESCRIPTION :

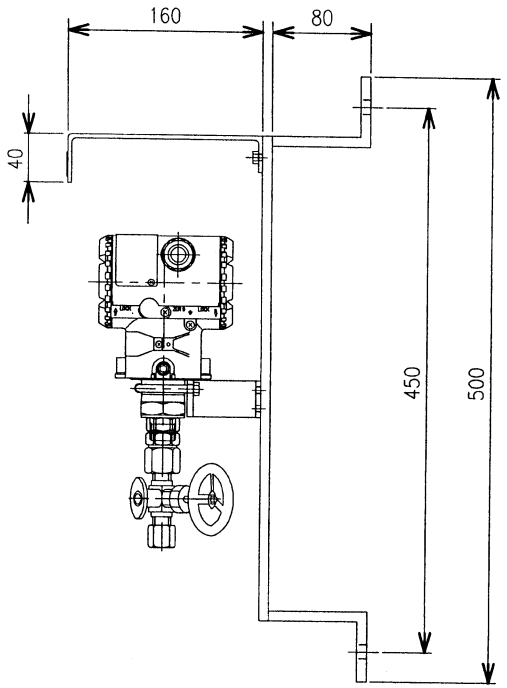
VENT LINE VALVE

DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho

SCALE	DWG. NO.	REV.
NONE	SV6PD049	△

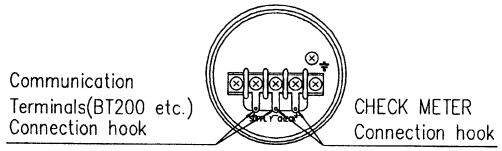
CONTROL NO. : SH0501V – 116 / 119





TAG NO.
3801-1
3801-2

* Terminal Configuration



* Terminal Wiring

SUPPLY ±	Power supply and output terminal
CHECK ±	External indicator(ammeter) terminal
⏚	Ground terminal

NOTE

1. Maker : YOKOGAWA
2. Type : EJA530A (Gauge P.T)
3. Working Range : 0 to 0.35 kg/cm²

4	3-WAY TEST COCK	SUS316L	2	NPT1/2"xø10
3	PRESS. TRANSMITTER	SUS316L	2	
2	NAME PLATE	SUS316	2	80x20x1t
1	BOARD	SS400	1	400x400x8t

SAMGONG VOS

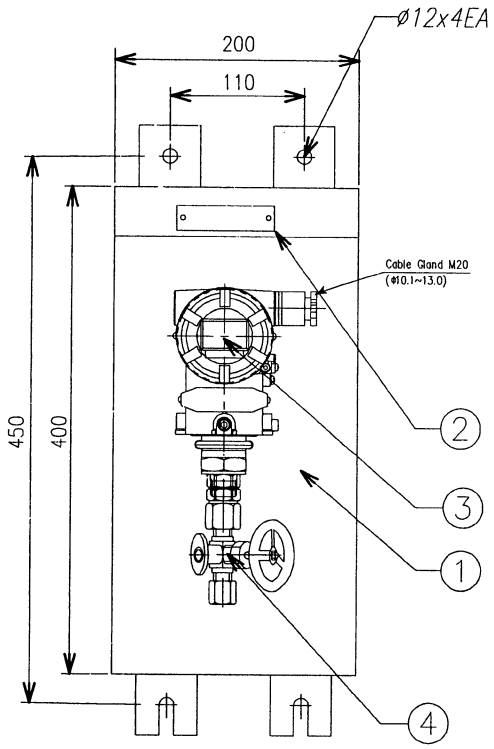
DESCRIPTION :

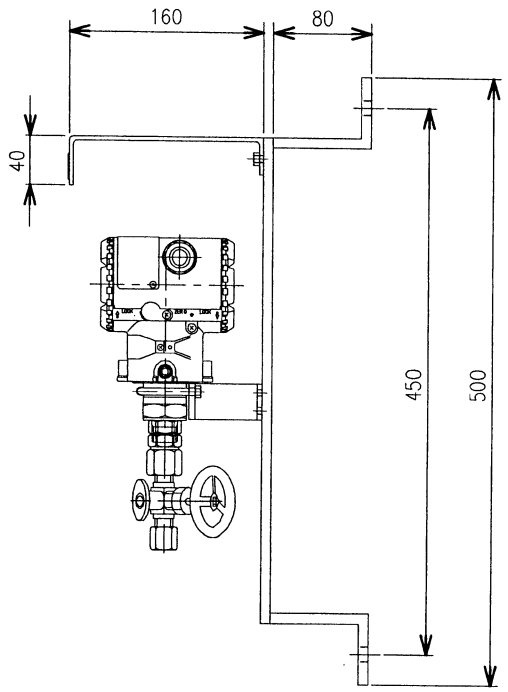
DECK MAIN
PRESSURE TRANSMITTER

DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho

SCALE	DWG. NO.	REV.
NONE	SVPD050	△

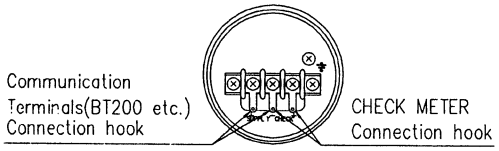
CONTROL NO. : SH0501V - 117 / 119





TAG NO.
3802

* Terminal Configuration



* Terminal Wiring

SUPPLY ±	Power supply and output terminal
CHECK ±	External indicator(ammeter) terminal
⏚	Ground terminal

NOTE

1. Maker : YOKOGAWA
2. Type : EJA530A (Gauge P.T)
3. Working Range : 0 to 0.35 kg/cm²

4	3-WAY TEST COCK	SUS316L	1	NPT1/2"xø10
3	PRESS. TRANSMITTER	SUS316L	1	
2	NAME PLATE	SUS316	1	80x20x1t
1	BOARD	SS400	1	200x400x8t

SAMGONG VOS

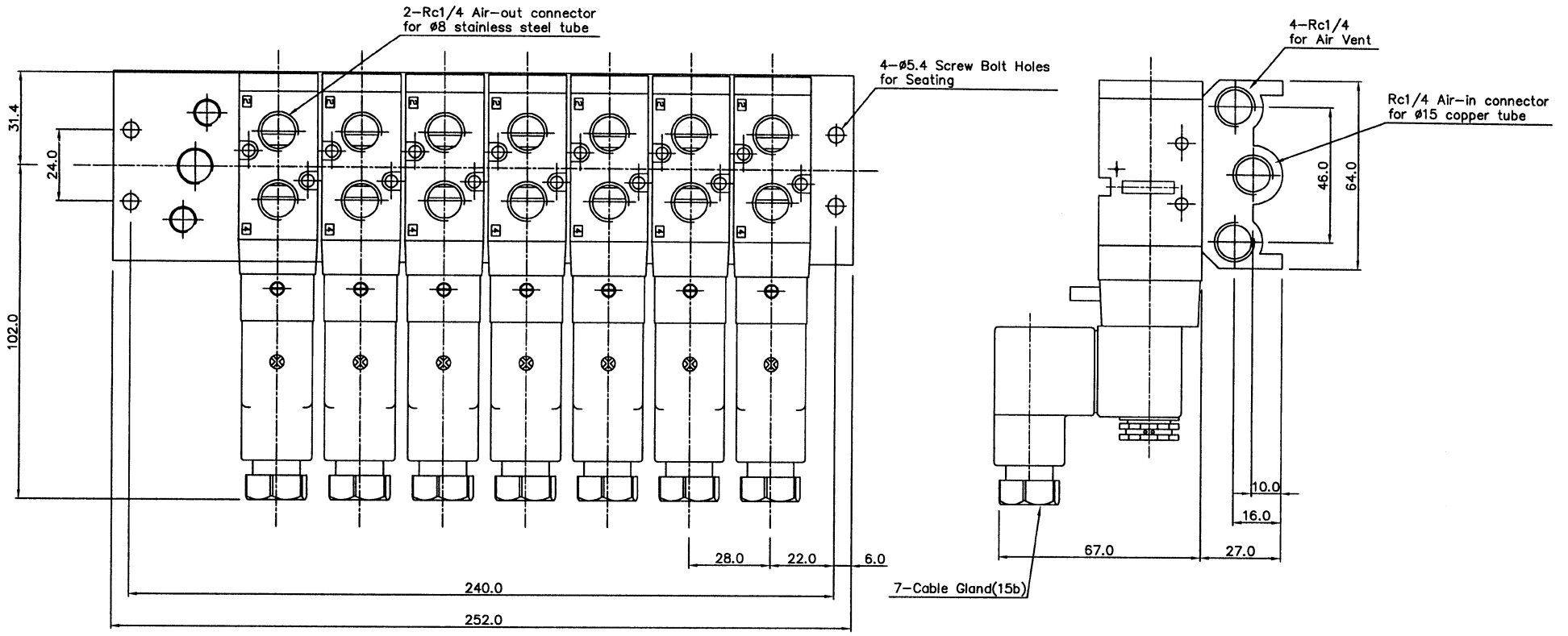
DESCRIPTION :

DECK MAIN PRESSURE TRANSMITTER (A.P.TANK LINE)

DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho

SCALE	DWG. NO.	REV.
NONE	SVPD051	△

CONTROL NO. : SH0501V - 118 / 119

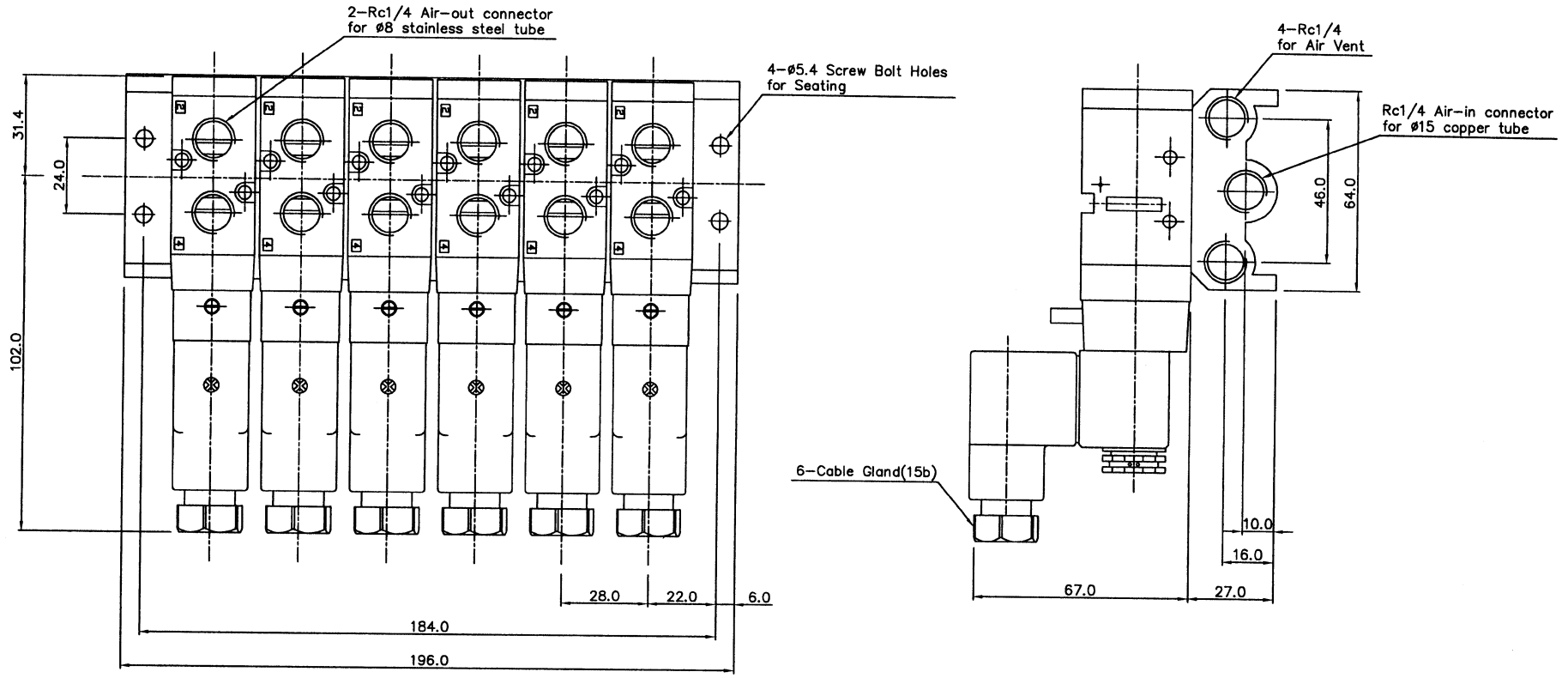


TAG NO.
3803-1

* NOTE : SEE NEXT PAGE 119B FOR DETAIL SOLENOID VALVE.

SAMGONG VOS	DESCRIPTION : SOLENOID VALVE BLOCK FOR PNEUMATIC CONTROL VALVE (MAIN BALLAST LINE)	DATE 10.06.15	BY D.S.Kim	CHECKED U.S.Shon	APPROVED Y.M.Cho
		SCALE NONE	DWG. NO. SV6PD052		REV. △

CONTROL NO. : SH0501V - 119 / 119

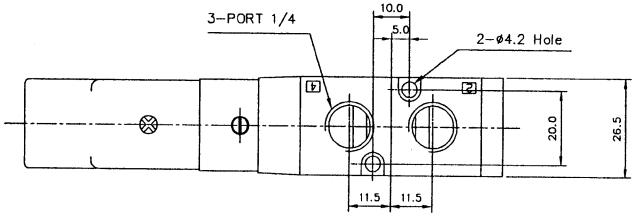


TAG NO.
3803-2

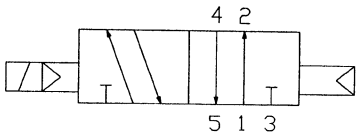
* NOTE : SEE NEXT PAGE 119B FOR DETAIL SOLENOID VALVE.

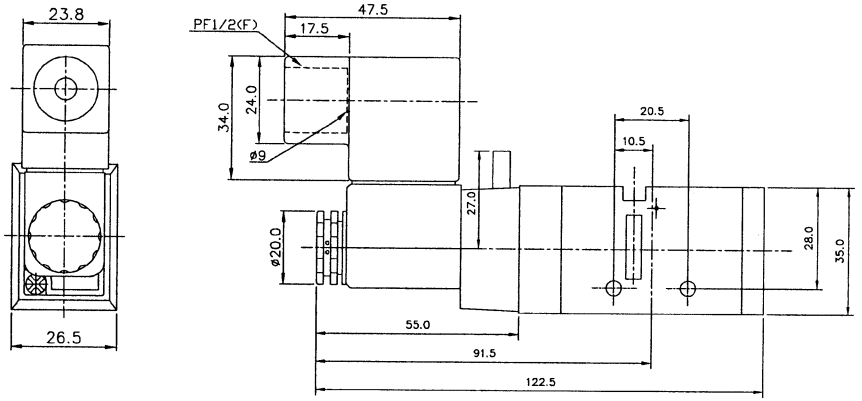
SAMGONG VOS	DESCRIPTION : SOLENOID VALVE BLOCK FOR PNEUMATIC CONTROL VALVE (A.P.TANK LINE)	DATE 10.06.15	BY D.S.Kim	CHECKED U.S.Shon	APPROVED Y.M.Cho
		SCALE NONE	DWG. NO. SV6PD053		REV. △

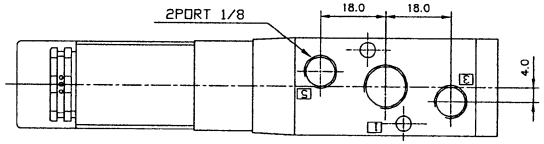
CONTROL NO. : SH0501V - 119A / 119



PORT MARKING







TAG NO.
3803

1. Q'TY : 13 EA
2. TYPE : 5PORT 2POSITION

MODEL / MAKER	PHS520S-8 / PARKER
FUNCTION	SINGLE
COMPATIBLE FLUIDS	COMPRESSED AIR
PRESSURE(kg/cm2)	1.5~9.0
AMBIENT & FLUID TEMP.	5~60°C(41~140°F)
MAX. OPERATING FREQUENCY	10cycle/sec.
MANUAL OVERRIDE	LEVER
MATERIAL(BODY / PLUG)	ALUMINUM / STEEL
ELECTRIC CON'N	CABLE GLAND (15b)
ENCLOSURE	IP65
CV	1.0

SAMGONG VOS

DESCRIPTION :

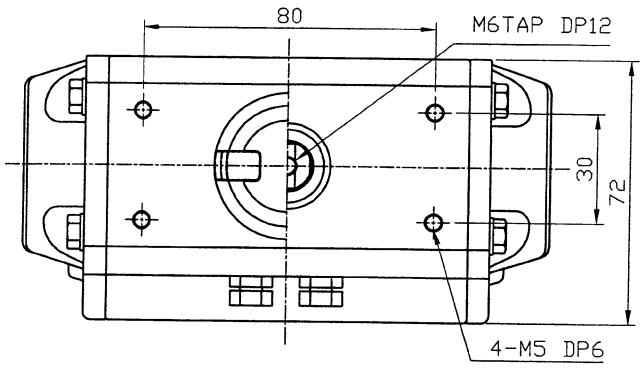
SOLENOID VALVE FOR
DECK/VENTURI BUTTERFLY VALVE

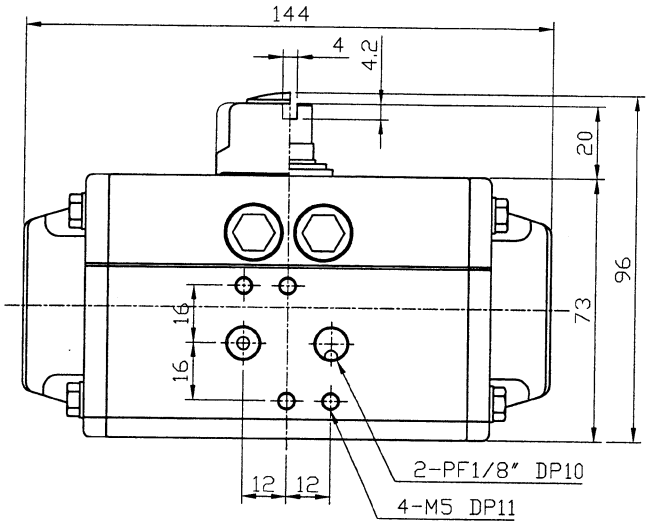
DATE	BY	CHECKED	APPROVED
10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho

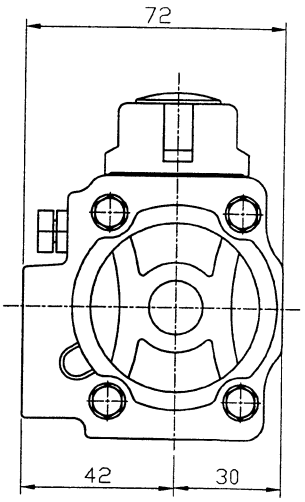
SCALE	DWG. NO.	REV.
NONE	SV6PD054	△

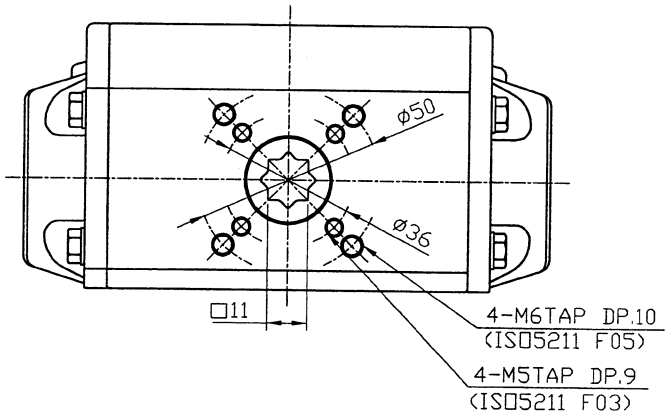
CONTROL NO. : SH0501V - 119B / 119

CONTROL NO. : SH0501V – 119C / 119





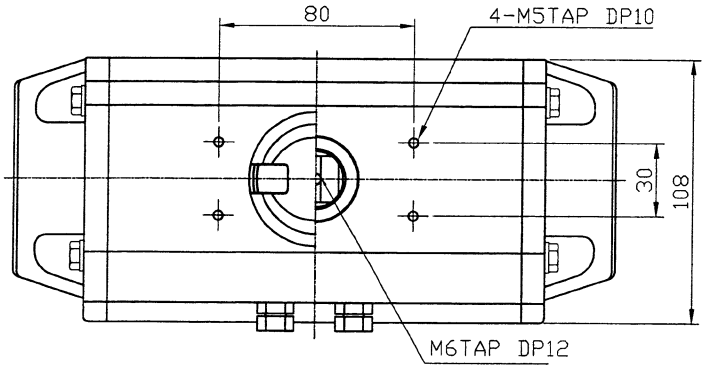


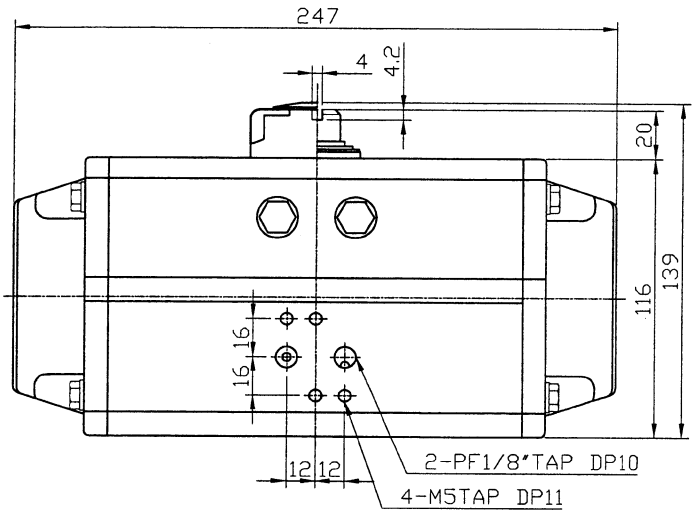


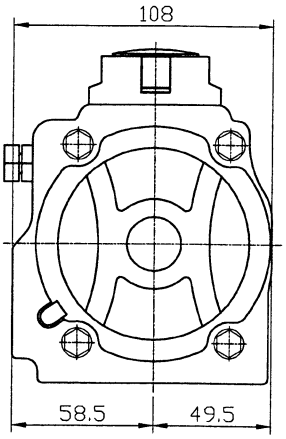
* MAKER : HKC CO., LTD.

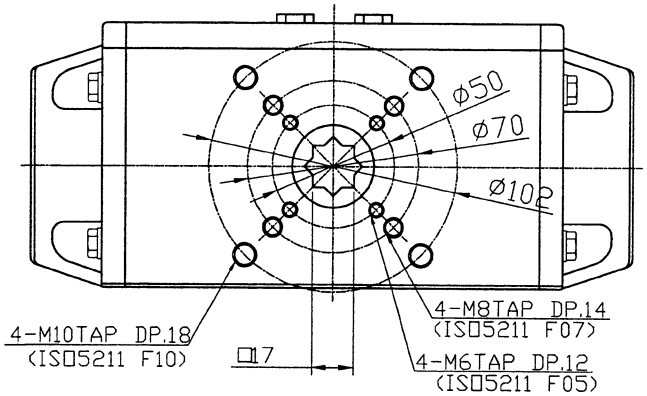
SAMGONG VOS	DESCRIPTION : PNEUMATIC ACTUATOR LAYOUT (MODEL : HP-050)	DATE 10.06.15	BY D.S.Kim	CHECKED U.S.Shon	APPROVED Y.M.Cho
		SCALE NONE	DWG. NO. P050-501-A		REV. △

CONTROL NO. : SH0501V – 119D / 119





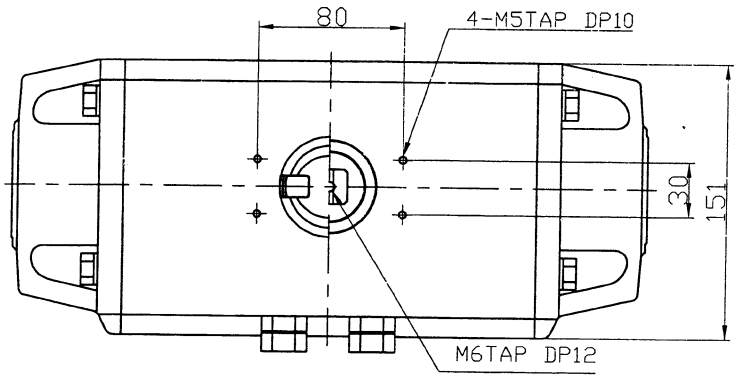


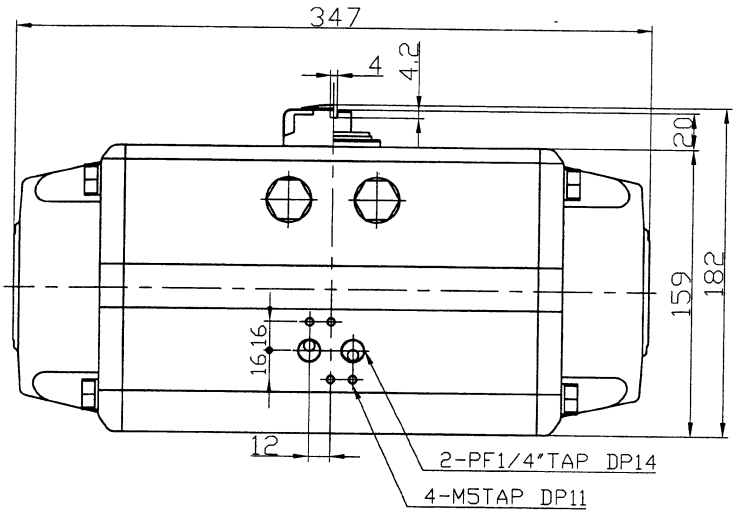


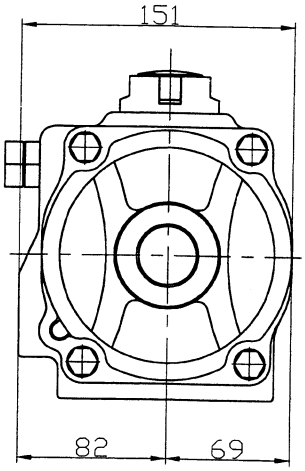
* MAKER : HKC CO., LTD.

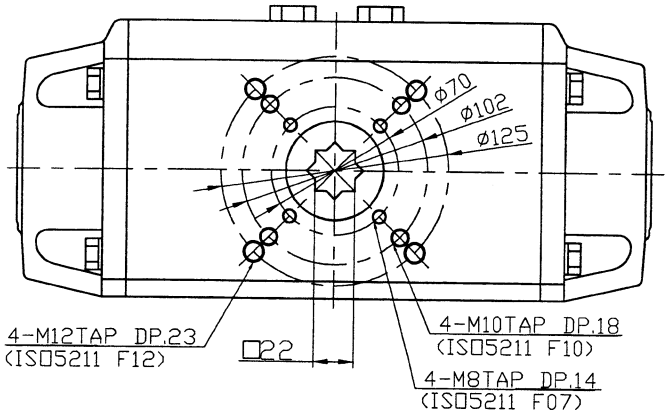
SAMGONG VOS	DESCRIPTION : PNEUMATIC ACTUATOR LAYOUT (MODEL : HP-088)	DATE 10.06.15	BY D.S.Kim	CHECKED U.S.Shon	APPROVED Y.M.Cho
		SCALE NONE	DWG. NO. P088-501-A		REV. △

CONTROL NO. : SH0501V – 119E / 119





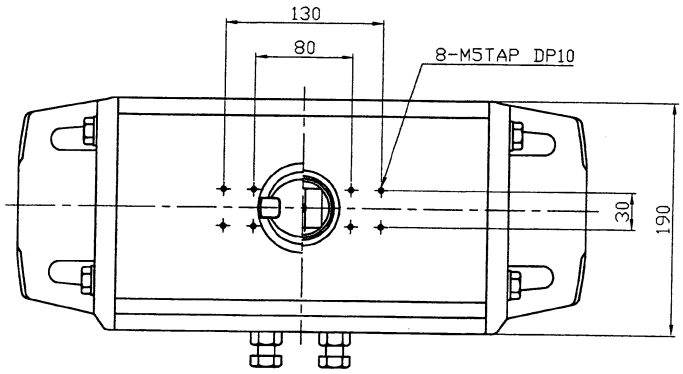


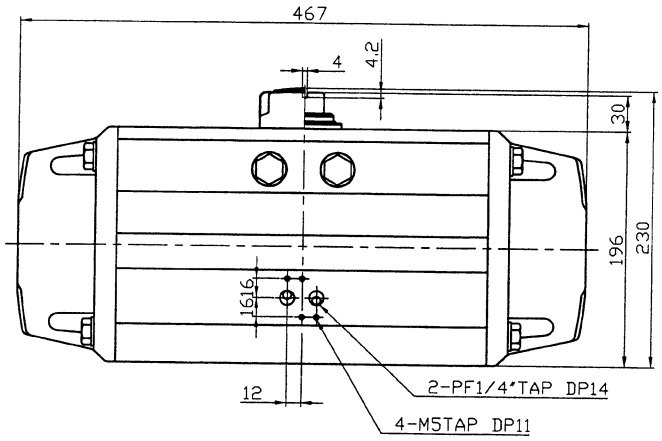


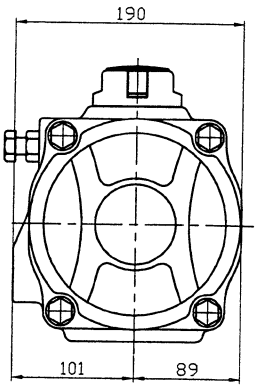
* MAKER : HKC CO., LTD.

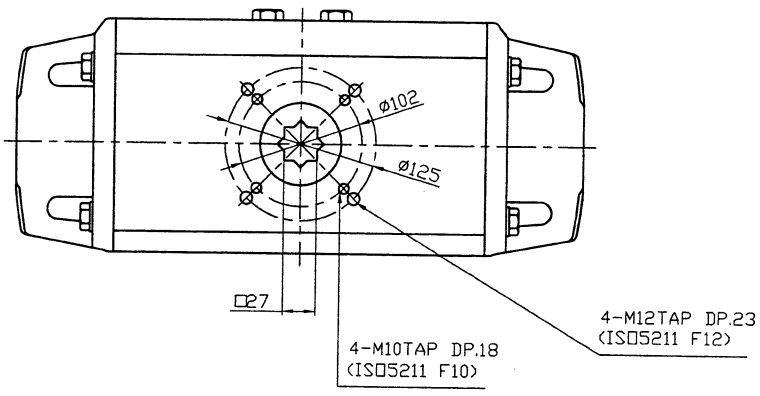
SAMGONG VOS	DESCRIPTION : PNEUMATIC ACTUATOR LAYOUT (MODEL : HP-125)	DATE 10.06.15	BY D.S.Kim	CHECKED U.S.Shon	APPROVED Y.M.Cho
		SCALE NONE	DWG. NO. P125-501-A		REV. △

CONTROL NO. : SH0501V – 119F / 119





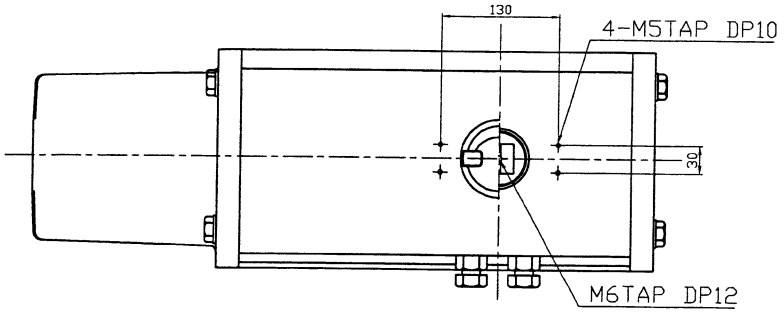


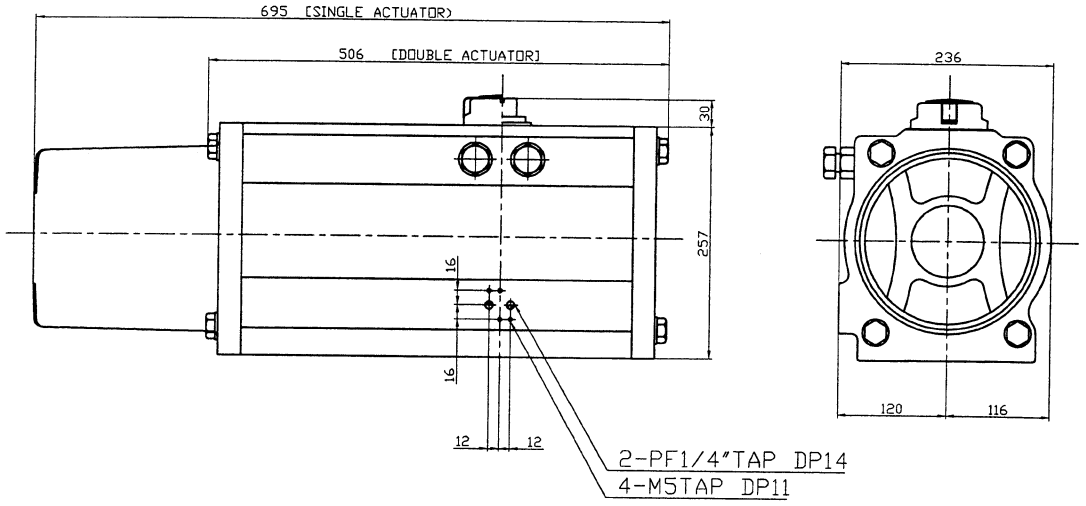


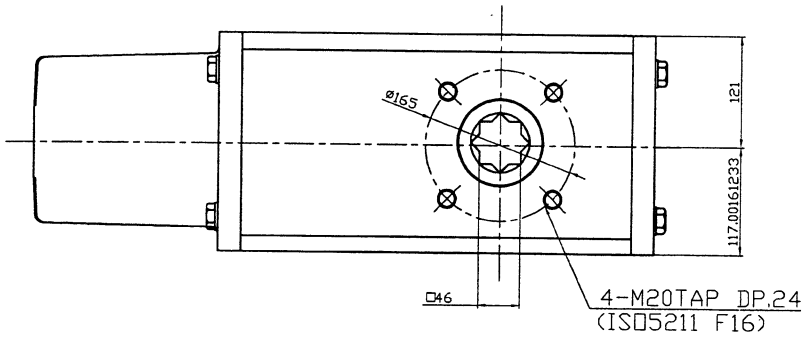
* MAKER : HKC CO., LTD.

SAMGONG VOS	DESCRIPTION : PNEUMATIC ACTUATOR LAYOUT (MODEL : HP-160)	DATE 10.06.15	BY D.S.Kim	CHECKED U.S.Shon	APPROVED Y.M.Cho
		SCALE NONE	DWG. NO. P160-501-A		REV. △

CONTROL NO. : SH0501V – 119G / 119







* MAKER : HKC CO., LTD.

	DESCRIPTION :	DATE	BY	CHECKED	APPROVED
SAMGONG VOS	PNEUMATIC ACTUATOR LAYOUT (MODEL : HP-211)	10.06.15	D.S.Kim	U.S.Shon	Y.M.Cho
		SCALE: NONE	DWG. NO.: P211-501-A		REV. △

GENERAL INFORMATION OF SAMGONG'S VENTURI OXYGEN STRIPPING ™ SYSTEM

GENERAL

This document describes the general information of Samgong's Venturi Oxygen Stripping ™ (VOS) ballast water treatment system. It contains the VOS system operation explanation, control system overview, control package installation notes and troubleshooting guide.
The purpose of this document is to increase customer's understanding about VOS equipment.
Please be noted that this document is subject to change and update without prior notice.

- CONTENT -

SAMGONG VOS

1. VOS SYSTEM OPERATION EXPLANATION

A. Stripping Gas Generator (SGG) Start Sequence

The start sequence describes the start-up of the Stripping Gas Generator (SGG). The SGG must be running with a stable flame before the ballasting or deballasting (ballast discharge) operation can begin.

To start the SGG select the operating mode, either 50% or 100% on the operator panel. The remainder of this explanation assumes 100% has been selected.

When the SYSTEM START button on either touch Screen of the Ballast Water Treatment Control Panel is pushed several permissives must be met before the SGG start sequence will continue [A "permissive" (permissives) is a condition that must be met before the start operation is "permitted" to continue].

The SGG Start Permissives Are:

- Control air, present.
- Overboard valve position, open.
- The EMERGENCY STOP Control Panel "mushroom" button, not engaged.
- Cooling tower water level, not high.

Equipment failures or alarms are indicated on the Ballast Water Treatment Panel in Cargo Control Room.

When the above permissives are met; the Cooling Water pump can be started along with SGG.

Operation of the VOS system SGG involves three burners; a pilot, a starter and a main burner, as well as the sequenced start-up and opening of two blowers; Blower #1 and Blower #2.

The Main burner is a Blue Flame Venturi Burner. It uses recirculating hot exhaust gas from the exit of the burner cone to vaporize fuel directly from the fuel injector before it reaches the combustion chamber. This type of burner generates a clean, blue flame with very low oxygen; however, it also requires a staged, ignition sequence.

B. SGG Ignition Sequence

From above;The SYSTEM START button is pressed and if the permissives are met, then:

When the cooling water system is up to operating pressure and no shutdown alarms are present, the #1 blower starts, the fuel pump starts and fuel pressure must be obtained within 5 seconds, then the control system sends a signal to the Honeywell 7830 "Air Flow OK". Then the Honeywell 7830 controller starts the firing (ignition) sequence.

The Pilot burner is lit using a spark from a high voltage spark plug. If fuel is provided to the Pilot burner for more than 3 seconds without the UV flame detector seeing a flame, Then the fuel is shutdown and the unit purged, If there is a flame failure, wash water is shut off and the SGG drain to the bilge. After 30 seconds a restart may be attempted.

When the Pilot burner is lit and the flame detector confirms a flame, the timed start sequence begins. This will continue as long as the flame detector senses a flame.

Fuel to Starter burner is turned on and ignited by flame from the Pilot burner. The timer then shuts off fuel to the Pilot burner.

The Starter burner burns for a few seconds to bring the burner assembly up to temperature. This is important because the Main burner uses hot gasses from the end of the burner cone, drawn back to the burner inlet to vaporize fuel before combustion.

After the Starter burner is established the blower start valve begins to close, forcing more air into the burner. At the same time one of the Main burner fuel valves is opened.

Fuel from the Main burner injector is vaporized by the hot gas from the Starter burner flame recirculating back from the outlet of the burner cone.

Vaporized fuel from the Main burner injector is drawn into the burner cone by the venturi effect of the blown air rushing from the plenum through the venturi burner into the combustion chamber.

Once drawn into the venturi burner, flame from the Starter burner ignites the vaporized fuel from the Main burner.

A timer then switches off the fuel to the Starter burner, and opens a second main fuel nozzle.

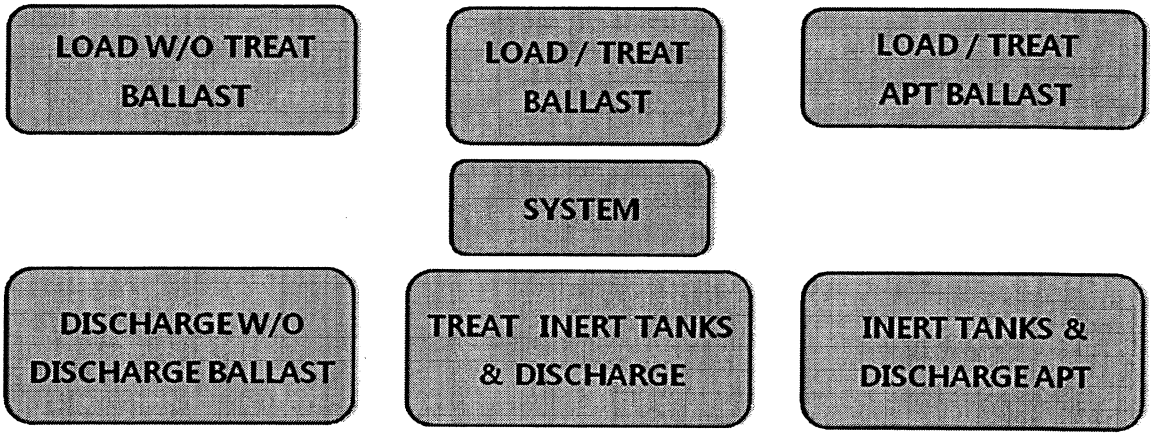
After a few seconds the burner will stabilize.

When the flame is stable the back pressure control loop will start and the system will enter the standby mode. The back pressure control loop uses the vent to atmosphere and SG delivery valves to maintain the set pressure in the SGG cooling tower. The valves open and close in response to the pressure in the cooling tower, to maintain constant back pressure. Under back-pressure, combustion air flow is slightly reduced and the O2 content falls to the required range of 0.1~0.3%. This is maintained by an oxygen trim control loop. There is a vent with a control valve between the blowers and the burner plenum, this vent is always partially open venting some compressed air from the blowers to atmosphere. The vent is opened or closed in response to signals from the oxygen trim control loop.

Now the ignition sequence is complete and the SGG flame is stable producing low oxygen SG, after about 3 minutes the ballasting operation can begin.

C. VOS OPERATION

Immediately after starting the SGG, the system will automatically be in SYSTEM STANDBY mode.
To begin a ballasting operation the operator must choose one of the ballasting operation buttons on the S.G DELIVERY screen. They are listed below:



The LOAD/TREAT BALLAST option allows the vessel to ballast using the VOS system to treat the water as it is pumped to the tanks.

The SYSTEM STANDBY option allows the operator to pause the ballasting (or deballasting) operation and keep the SGG running. During standby, SG is vented to atmosphere via the vent valve. It is not recommended to keep the system on standby for extended periods of time, more than 15-20 minutes, as unnecessary amounts of fuel will be used.

The STRIPPING TANKS & DISCHARGE BALLAST option allows the vessel to discharge ballast and fill the ballast tank head space with SG. This is an important second step of the VOS system.

When the operational selection is made, by pressing the appropriate button, the Control System will line up the deck valves accordingly.

- LOAD/TREAT MAIN BALLAST Valve Line-up :

1903	• Delivery/Pressure Control Valve - Open.
3102	• Ballast Tank Gas Delivery Valve - Closed.
2002-1/2	• Venturi Gas Delivery Valve - Open.
2004-1/2	• Ballast Reaeration Valve - Closed.
2006-1/2	• Venturi Ballast Water Regulating Valve - Open.
3501	• Mast Riser Valve - Open.

-LOAD/TREAT A.P TANK Valve Line-up :

1902 • A.P. Tank Delivery Control Valve - Open.
2104 • A.P. Venturi Reaeration Valve - Closed.
2105 • A.P. Venturi Delivery Water Pressure Control Valve - Open.
2102 • A.P. Venturi Gas Delivery Valve - Open.
3502 • Vent line Valve - Open.
3107 • Venturi to A.P. Tank Valve - Open.
3108 • Venturi to Overboard Valve - Closed.

If LOAD/TREAT BALLAST is selected, the ballast pump(s) may now be started.

During ballasting influent ballast water is pumped through the venturi injectors. The flow of ballast water through the venturi injectors draws SG from the SGG into the ballast water stream.

Infusion of the inert gas into the ballast water is the critical action that allows VOS treatment to work.

During ballasting the amount of inert gas delivered to the ballast water is approximately 1.25 times the volume of ballast water. This is regulated by the vent valve which is controlled by the back pressure control loop previously described.

When ballasting is complete, or paused, the ballast pump is turned and the setting changes to; SYSTEM STANDBY (SYSTEM STANDBY is described below), or the SYSTEM STOP button to initiate a "soft" stop to the SGG unit. This will turn the SGG off.

-SYSTEM STANDBY MAIN BALLAST Valve Line-up :

1903 • Delivery/Pressure Control Valve - Closed.
1901 • Back Pressure Control/Vent-to-atmosphere Valve - Open.
2002-1/2 • Venturi Gas Delivery Valve - Closed.
3501 • Mast Riser Valve - Closed.
2006-1/2 • Venturi Ballast Water Regulating Valve - Closed.

-SYSTEM STANDBY A.P TANK Valve Line-up :

1902 • A.P. Tank Delivery Control Valve - Open.
2102 • A.P. Venturi Gas Delivery Valve - Closed.
3502 • Vent line Valve - Closed.
3107 • Venturi to A.P. Tank Valve - Closed.
2105 • A.P. Venturi Delivery Water Pressure Control Valve - Closed.

Under the standby condition no gas is flpwing to the venturis but operating back-pressure is maintained by the vent-to-atmosphere valve.

When standby is over the operator can press either of the other buttons and again VOS treatment or ballast tank inerting will take place.

Running the system on standby uses fuel, therefore it should not be run for longer than 15-20 minutes to conserve fuel. The system can be simply shut down and restarted.

- STRIPPING TANKS & DISCHARGE MAIN BALLAST Valve Line-up :

1903	• Delivery/Pressure Control Valve - Open.
2002-1/2	• Venturi Gas Delivery Valve - Closed.
3501	• Mast Riser Valve - Closed.
3102	• Ballast Tank Gas Delivery Valve - Open.
2004-1/2	• Ballast Reaeration Valve - Open.
2006-1/2	• Venturi Ballast Water Regulating Valve - Open.

- STRIPPING TANKS & DISCHARGE A.P TANK Valve Line-up :

1902	• A.P. Tank Delivery Control Valve - Open.
2102	• A.P. Venturi Gas Delivery Valve - Closed.
2104	• A.P. Venturi Reaeration Valve - Open.
3105	• A.P. Tank Gas Delivery Valve - Open.
3108	• Venturi to Overboard Valve - Open.
3107	• Venturi to A.P. Tank Valve - Closed.

Ballast tank stripping allows SG to fill the head space of the emptying ballast tanks. Filling the ballast tanks with SG during the cargo part of the voyage prevents corrosion in the ballast tanks and makes sure there is no oxygen available in the ballast tanks to re-aerate the next load of ballast water.

The amount of SG in the deck gas line is regulated by the deck pressure control loop. The deck pressure control loop works in the same way as the back pressure control loop but uses a pressure sensor on the deck gas SG line instead of the cooling tower pressure sensor. The deck pressure control loop also uses the vent valve to maintain the correct the pressure in the deck gas line.

It is important to make sure that the discharge rate of ballast is not more than the stated flow rate of the vessel's ballast pumps. Multiple tanks must not be emptied by a combination of ballast pump(s) and gravity (it is not possible to empty ballast tanks using gravity and ballast pumps on all vessels). If this happens it is possible there will not be enough SG to fill the head space of the emptying ballast tanks, then air will be drawn into the ballast tanks through the P-V valve.

When the ballast loading or ballast discharging operation is complete the ballast pump is turned off by pressing the; SYSTEM STOP button. This initiates a "soft" phased shutdown procedure for the VOS treatment system.

D. VOS SGG Shutdown Procedure

For a normal (Non-Emergency) shut down a phased shutdown routine is initiated by pressing the SYSTEM STOP button.

First, the fuel pump is stopped and the flame goes out. Blower #2 is also stopped immediately.

The cooling water pump and Blower #1 remain switched on. They will switch off after a cool-down delay.

The delayed switch offs allow the SGG to purge vapors from the combustion chamber and continue cooling the combustion chamber/cooling tower. The cooling water pump and Blower #1 are automatically shut off by the control system.

If required the control system is configured to allow a restart during normal phased shutdown routine.

All available analog values are so scaled in engineering units and displayed on the screens for continuous online real time monitoring.

Pushing the EMERGENCY STOP "mushroom" button on the face of the Control Panel shuts down the entire system, including the Cooling water pump immediately.

E. VOS System and SGG Monitoring Alarms and Trips

To maintain safe ballasting operations, required IG quality, and complete VOS treatment. The control system monitors components, system parameters and treatment parameters.

As described above, when the VOS system is operating it runs its own monitoring and control systems, the back pressure control loop, and the deck gas control loop. The VOS system will monitor itself, treating the ballast water without input from the crew.

Sometimes an alarm condition may occur which the system cannot correct itself, for example, a cooling water pump failure, will immediately trip the VOS system. Other alarms are structured as "High" or "Low" alarms indicated visually on the control panel screen and by an alarm horn. If the problem continues to get worse these alarms will escalate to "High High" or "Low Low" alarms and the system will either trip a component or the entire system.

If the system immediately trips or shuts down due to a "High High" or "Low Low" alarm the operator must see the control panel for the source of the problem and physically fix the problem. In the case of a cooling water pump failure, the cooling water supply would need for to changed.

In the case of a "High" or "Low" alarm it is possible for the operator to correct the problem before a trip occurs.

On the next page is a table listing all of the alarms and trips in the VOS system. For a complete list of corrections and solutions to the alarms and trips please see the Trouble Shooting section of the VOS Operations Manual.

SAMGONG VOS

2. CONTROL SYSTEM OVERVIEW

The Ballast Treatment control package provides integrated monitoring and control of the elements in the Ballast Treatment system.

The system is operated from a touch-sensitive display screen located in the cargo control room. Operating parameters and process information are displayed on this screen, as well as any alarm information. The only physical buttons in this location are a horn silence and emergency stop push button.

To operate the system, the operator must first decide which cooling water pump will be selected for use and if the system will be running at fifty percent or one hundred percent capacity. Then the operator presses the "START" soft-key. This begins the automated start-up sequence for the Stripping Gas Generator. The selected cooling water pump is started, and when flow is established, the first combustion air blower is started and the unit goes through a safety purge cycle.

At the end of the safety purge, the pilot burner is lit. Shortly after ignition, the start valve for burner #1 is opened and used to establish a steady flame; once a flame is established the system will open the first of two run oil valves for burner #1. After a short delay the system will open the second run oil valve for Burner #1 and at the same time shut off the start valve for burner #1. If fifty percent capacity was selected this will complete the light off sequence.*

After a time delay to stabilize the fire, the internal control loops are engaged, to begin active control of the inert gas output. At this point, the operator station indicates the system is in "Standby" mode. The operator may now select whether he/she is taking on or discharging ballast.

When the SG generator output is within operating range, the operator may initiate operation by pressing the appropriate button on the control screen, and starting the ballast pump. Vital process information is displayed on the screen in real time.

*If one hundred percent capacity is selected, the second combustion air blower is turned on and once up to speed the start oil valve for burner #2 is opened starting a trial ignition period; once a steady flame for burner #2 is established the system will open the first of two run oil valves for burner #2, and after a short delay the system will open the second run oil valve for burner #2 and at the same time the start valve for burner #2 is shut off. This would complete the light off sequence for the second burner.

In the event a non-acceptable condition arises, an alarm horn is sounded and the display indicates the nature of the problem. In some cases, the system will automatically shut down as well.

A second, smaller touch-screen display is located near the SG generator. This display permits control of the system, but also provides password-protected means of access to various tuning parameters.

In the event of failure of the Ballast Water Treatment Control screen, this smaller screen also provides operating access to the system.

SAMGONG VOS

3. CONTROL PACKAGE INSTALLATION NOTES

There are four specific items in the controls package: The Motor Control Cabinet, the Main Control Cabinet, the Ballast Water Treatment Control station, and the Local Control station. Communication among these items is accomplished primarily via digital protocols. This serves to greatly simplify wiring connections.

The Motor Control Cabinet contains all the 440V wiring. This cabinet contains the Main disconnect for securing power to the system and also contains the power feed transformer for the Main Control cabinet. Other items located in the Motor Control cabinet include the motor protection and soft starters for both Blowers and the motor protection and contactor for the fuel pump. Terminals have been provided for all interconnecting wires to simplify the wiring between cabinets.

The Main Control cabinet contains the process logic controller and all associated input/output modules as well as the Ethernet Networking Interface Unit (ENIU). This is where all logic is executed via a central processing unit and is integrated with Honeywell Burner control protection and flame scanning techniques. This cabinet also contains the 24 VDC supply, control system breakers, thermistor overload protection board, Emergency stop relay, an Ethernet switch, and interposing relays for control of field devices. All limit switches; temp switches, pressure switches, and solenoids associated with the SG generator are connected to the Main Control cabinet. Analog inputs and outputs associated with the SG Generator (e.g. pressure transmitters, RTD's and control valve I/P transducers) are connected to the Main Control Cabinet as well. Terminals are provided for all connections save the data cable connections, which are landed to the Ethernet switch in the left upper most part of the cabinet.

The Local Control station provides a six inch touch-sensitive display screen for local operation and troubleshooting access to the Ballast Water Treatment system and is intended to be mounted near the SG generator, specific location to be governed by convenient access for the crew. This control station also includes an emergency stop and horn silence pushbutton.

The Ballast Water Treatment Control station consists of a monitor mount with a twelve inch touch-sensitive display screen; this station is intended to provide comprehensive control and troubleshooting of the entire Ballast Water Treatment System. This station provides real-time process data for the entire system and includes an emergency stop, horn silence pushbutton as well as an alarm light and horn. Mimic screens are provided for ease of operation and troubleshooting from the Cargo space.

The (optional) Safety Barrier enclosure is connected between the Main Control cabinet and the associated field devices. Safety Barriers are required only when the deck equipment is mounted in a Hazardous environment, such as an oil tanker.

Connections:
Main Control cabinet field devices should be connected using good shipboard electrical practices. Analog wiring should not be bundled with high-voltage cables. In almost all cases, connections may be made with two-conductor marine cable, #16AWG, approved for power applications, such as 2SJ-16. RTD's require three-conductor cables.

Connections between the Main Control cabinet and the Local Control Cabinet includes a single run of a six-conductor cable which needs to be comprised of #18 AWG or larger and a single run of data rated cable (CAT5e Ethernet cable). This Ethernet cable is to be dedicated exclusively for the Ballast Treatment system. Connections are to be made in strict compliance with best Ethernet practices. See cable layout drawing # INT C1-10 and service information for detailed connection data.

Connections between the Main Control cabinet and the Ballast Water Treatment Control Station consist of a single run of an eight-conductor cable carrying 24VDC power to the Cargo Control Station; emergency stop horn silence inputs, alarm light and horn connections, and a single run of data rated cable (CAT5e Ethernet cable). This Ethernet cable is to be dedicated exclusively for the Ballast Treatment system. Connections are to be made in strict compliance with best Ethernet practices. See cable layout drawing # INT C1-10 and service information for detailed connection data.

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4. Troubleshooting Guide for the S.G. System:
If an alarm sounds, silence horn and begin troubleshooting the cause, the screens will provide insight as to the cause of any alarm, use the drawings and basic electrical troubleshooting techniques to test field circuitry.

Cooling Water Pressure alarm:
Check to see that the cooling water pump valves are set correctly and that the system is receiving proper water pressure while the pump is running. Also ensure that the pressure switch is adjusted for operating pressures when the cooling water pump is running.

Water Level High alarm:
Check the water level in the generator to ensure that the system is not flooded and that the water float switch is functioning correctly as well.

Cooling Water Temperature High alarm:
First check to see that the process is at the correct temperature. Look at the Cargo screen for temperature indication and determine if it is beyond the set-point configured on the set-point screen. If the temperature reads incorrectly check the RTD sensor.

Fuel Oil Pressure Low alarm:
Make sure that the fuel pressure comes up to operating range. Check to see that the fuel pump is lined up correctly and that the pressure switch is correctly set for operating pressure when the fuel pump is running.

Combustion Air Pressure Low alarm:
First check to see that the system is receiving proper air flow. Also ensure that the pressure switch for combustion air is adjusted correctly for the operating range of the blowers and that the blower vent valves are functioning.

GAS Pressure High alarm:
Look at the screen to for Gas Pressure indication and determine if it beyond the set-point configured on the set-point screen. If it is not, then check the transmitter calibration and signal being transmitted to the system.

Oxygen Content High alarm:
Check to ensure that the oxygen content is at the correct level this is displayed on the screen and locally on the analyzer. If the oxygen content is acceptable check that the process value is not beyond the set-point on the set-point screen and ensure the analyzer and corresponding signal is functioning correctly.

Oxygen Content High High alarm:
This particular alarm has two independent inputs; one is driven off of a contact on the back of the oxygen analyzer and configured by the analyzer and the other off of the analog signal coming from the analyzer. If the oxygen content is not truly in the alarm state check that the alarm value is not beyond the configured set-point on the set-point screen and ensure the analyzer is signal is functioning correctly.

Low Control Air Pressure alarm:
Determine if the control air valve is open to the system and that the system is receiving proper control air flow. Also ensure that the control air pressure switch is set correctly for the operating pressure of the control air compressor.

High Gas Temperature alarm:
First check to see that the process is at the correct temperature. The screen will provide temperature indication and determine if it is beyond the set-point configured on the set-point screen. If the temperature reads incorrectly check the RTD sensor.

Low Deck Main Pressure alarm:
First check to see that the deck pressure is at an acceptable level. If the level seems to be normal look at the screen for pressure indication and determine if it is below the set-point configured on the set-point screen. If the temperature still reads incorrectly check the transmitter calibration and the signal coming to the system from the sensor.

Low Low Deck Main Pressure alarm:
First check to see that the deck pressure is at an acceptable level. If the level seems to be normal this alarm is generated with a discrete pressure switch and may need adjustment.

High Deck Main Pressure alarm:
First check to see that the deck pressure is at an acceptable level. If the level seems to be normal look at the screen for pressure indication and determine if it is above the set-point configured on the set-point screen. If the temperature still reads incorrectly check the transmitter calibration and the signal coming from the pressure sensor. This Alarm is configured off of the same analog signal as the Low Deck Pressure alarm.

High Dissolved O2 content:
Dissolved Oxygen is a calculated value based on operational conditions so no troubleshooting is required. This value is derived from other system parameters.

Communication Failure:
There is internal monitoring logic that looks at the status of communications between the Remote (ENIU) Ethernet Networking Interface Unit and the Central processor and if it is reported that there is a fault, a communications alarm will be present and there will be a fault light on the (ENIU). First check that the Ethernet devices are indicating that there is communications by looking at the status lights located near the RJ-45 plug in connector.

It should be noted there is a screen to aid in troubleshooting where the failure point occurred on the cargo control station. There is also a reset button for renewing/resetting faults in the PLC and ENIU.

Flame Fail Burner #1:
A flame signal has been lost to the flame scanner. First Check for blockage and verify the flame is being seen by the scanner because the fire went out due to process failure and/or there has been a monitoring equipment failure. Re visit the start up sequence and monitor the process to ensure fuel and air is sufficient to sustain a flame and that the Burner has been properly lit. The flame scanner should see a flame and send the proper signal to the EC7830 Honeywell burner controller. The signal strength is indicated as such inside the main control cabinet on the burner control display module.

Flame Fail Burner #2:
This alarm indicates that there has been a loss of flame detection to the EC7823 Honeywell Flame Scanner module. This will occur if there is a trial ignition or burner failure of the #2 burner when attempting to run the system at 100% capacity. This can be caused by an obstruction or failure of flame monitoring equipment. The system will allow for restarting the burner #2 light off sequence "on the fly" with the system running.

Early Flame Detection Burner #2:
This alarm occurs if the Ballast control system is running at 50% capacity and a flame is detected on the Burner #2 flame monitoring circuitry. Burner #2 monitoring circuitry should not detect a flame unless the system is running at 100% capacity and Burner #2 has been selected for operation and is running.

Overboard Valve Position alarm:
The signal for overboard valve position has reported that the valve is in the incorrect position. This is a signal coming from a limit switch located on the overboard valve.

Cooling Water Pump Failure alarm:
The Cooling Water Pump has been told to run and has not started or has not reported back to the system that it was running within a configurable amount of time. Check for proper operation and feedback from the starter.

Blower #1 Failure alarm:
Blower #1 has been told to run and the Soft Start has not reported back to the system that it has reached the top of ramp or the contactor has not been engaged within a configurable amount of time. Check for proper operation and feedback from the motor soft starter.

Blower #2 Failure alarm:
Blower #2 has been told to run and the Soft Start has not reported back to the system that it has reached the top of ramp or the contactor has not been engaged within a configurable amount of time. Check for proper operation and feedback from the motor soft starter.

Fuel Oil Pump Failure alarm:
The Fuel Oil pump has been told to run has not started or has not reported back to the system that it was running within a configurable amount of time. Check for proper operation and feedback from the motor protector and contactor.

Mast Riser Valve Failure alarm:
The Mast Riser valve has been told to change position by the system and has not reported back to the system that it changed position within a configurable amount of time. Check for proper operation and feedback from the valve limit switch.

Deck Water Seal (DWS):
The deck seal must be supplied with water flow of 2 - 4 m3/hr at all times otherwise "DWS Low Flow" alarm will occur and shut down the SGG.
Information alarms are also provided for "DWS High Water Level" and "DWS Low Water Level".

GO TO Standby Over Pressure / High O2:
This alarm will return the Ballast Control System to the "Standby" mode of operation if the oxygen content has exceeded the desired threshold for a period of time or if the system has reached an unsafe operating pressure. Review processes at the time of alarm to determine cause and corrective action.

I/O Failure alarm:
The processor has reported a fault of an Input or Output module this can be reset by simply holding in the horn silence button for a period of more than 10 seconds. If the fault persists the software contained within this manual can be installed and used for communicating with the system to properly identify the hardware failure.

Loss of the "PLC OK" output from the SG system:
There is internal logic present that monitors the status of the PLC equipment and is held high if no error is present. This can be reset by simply holding the horn silence pushbutton in for a period of more than 10 seconds. If the output remains low it is because one of the following errors is present: processor failure, low battery, bad ram, unrecoverable software error, storage error, or an I/O fault.